

**Canada's
Forest
Industry**

the next twenty years: prospects & priorities



**Woodbridge, Reed
& Associates**

Canada's Forest Industry

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Fibre Assumptions

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VOLUME V
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PREFACE TO VOLUME V

This study of the Canadian Forest Products Sector was commissioned by the Canadian Forestry Service. The purpose of the study is to assess the development potential for the sector. The study assesses the demand outlook for existing and potential forest products, the current and potential competitive position of the various sub-sectors of the industry in Canada and the available resources.

The full report on this study comprises six volumes. The contents of the full report are outlined as follows:

Volume I	Strategic Analysis
Volume II	World Demand - Supply
Volume III	Pulp and Paper
Volume IV	Wood Products
Volume V	Fibre Assumptions
Volume VI	Cost Projections

Volume V discusses the fibre supply and fibre cost assumptions for Canada upon which the analysis of the other volumes of this study are based. The discussion in Volume V relates only to Canada. Global fibre supply issues are incorporated as part of Volume II.



Scope of Analysis in Volume V

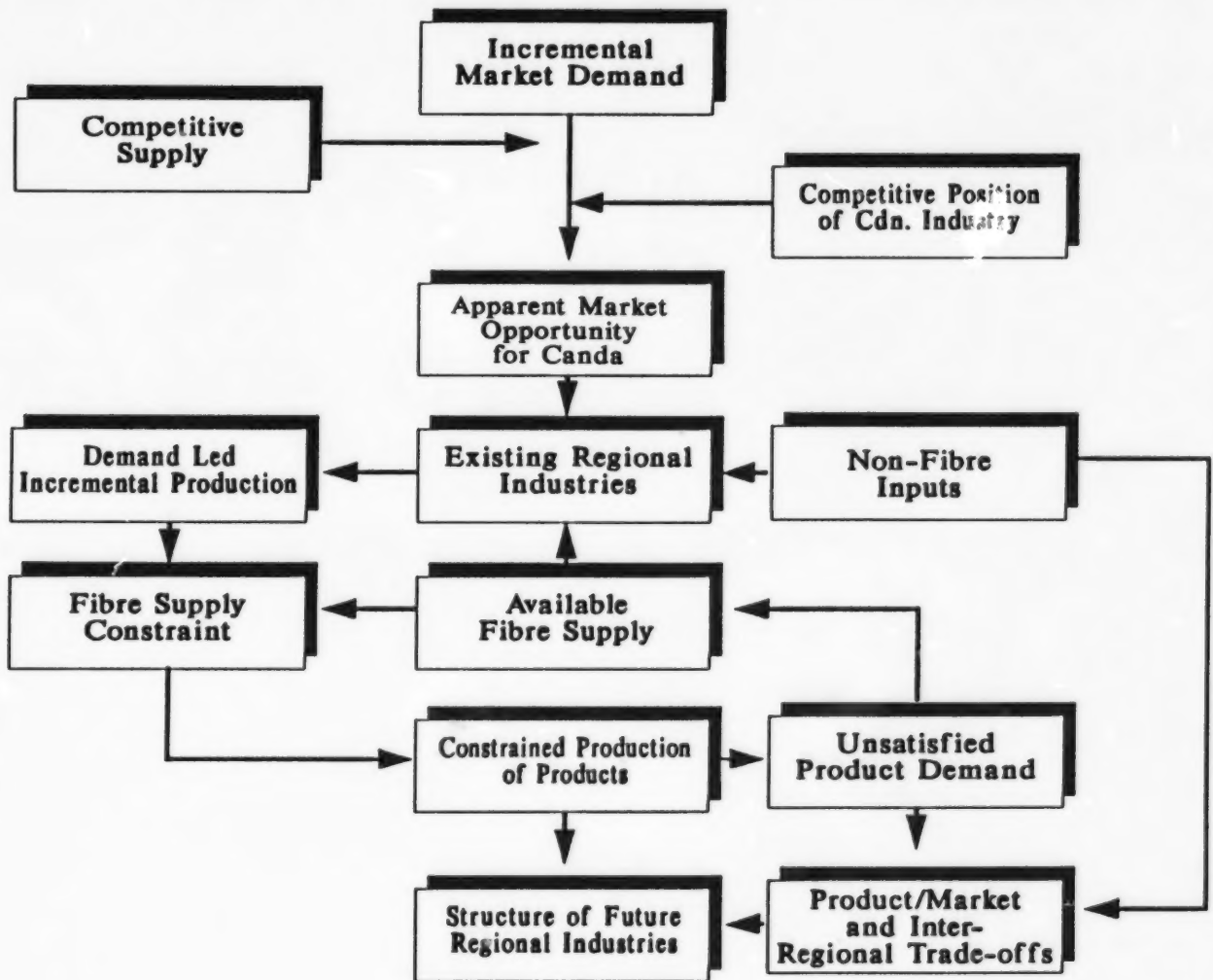
The purpose of this volume is to present our assumptions regarding incremental virgin fibre supplies available within Canada to the Year 2010. These assumptions are incorporated in the analysis provided in other volumes of this study. Specifically, the incremental fibre supply conclusions for Canada, as presented in this Volume, are compared, in Volumes III and IV with the global demand driven opportunities for Canada identified in Volume II. Readers should refer to Volumes III and IV where there is discussion of the extent to which the demand-driven scenarios are likely to be achieved, or limited, by Canada's apparent incremental virgin fibre supply availability.

In practice, fibre supply is dynamic. It responds to a number of influences, including price. We have therefore incorporated in the analyses presented in Volumes III and IV some assumptions of what we believe will be the future trend in fibre costs in Canada. Although predictions of this type have obvious limitations, at least they incorporate a measure of the price elasticity of supply. Also included in previous Volumes, but not discussed here, is the 'supply response' attributable to factors such as:

1. changes or shifts in process technologies which permit higher product yield from a given unit of fibre (eg. CTMP vs. kraft);
2. changes or shifts in product technologies which permit manufacturers to adapt to local or regional resource constraints or changes;
3. availability and acceptability of other fibres and non-fibre inputs (in paper and paperboard products)

Discussions of these and other factors can be found in the relevant Volume of this study. It may be useful to the reader, however, to be aware of the "rationalization process" logic that we have followed. This is shown diagrammatically in Figure 1.

Figure 1
Rationalization Process
Incremental Product Demands and Fibre Availability



Source: WRA

Our approach is as follows. The model is demand driven. Based on the analysis of opportunities for Canada identified in Volume II, market opportunity by product, market area and apparent volume was allocated to these regions of Canada which it is believed could meet the needs of the marketplace in the most efficient manner. The allocation criteria included historical trading patterns (including those of competitors), location of existing productive capacity within Canada, transportation systems and competitive costs.

Incremental product volumes were then translated into fibre requirements by type (i.e. softwood or hardwood timber, residual chips, sawdust/shavings, etc.) and compared to the apparent regional fibre surplus. If fibre supply proved to be a production constraint, then the degree of unsatisfied demand was recorded. Based on efficiency criteria and the net benefits expected from a series of production options that could be supported by the available fibre supplies, the production options were prioritized. Product/market and interregional trade-off analysis was then undertaken in an effort to meet unsatisfied demand.

This rationalization process recognizes the structure and productive capacity of the existing Canadian industry and its ability to adapt to changing market conditions. It has a number of important implications as to how the structure of the Canadian forest sector is likely to develop to the Year 2010. These implications are discussed in Volumes I, III, and IV, on a national and regional basis.

Limitations of the Fibre Supply Data

It should be noted that in accordance with our terms of reference, our fibre supply study has been limited to the collection and critical assembly of the most recent official data available from provincial forest services. Where appropriate, physical supply (allowable annual cuts) have been discounted to arrive at an approximation of economic accessibility. A much more definitive Canadian timber supply analysis is now being carried out under the aegis of the Canadian Forestry Service. Although the results of this study apparently may not be available before 1989, it is anticipated that they will not be in significant conflict with the assumptions contained in this report.

Also, it should be noted that estimates of current demand are based upon the estimated fibre-using capacities of the Canadian forest industries as of December 1987. Although fibre demand in roundwood equivalents has been derived from capacity/production data, every effort has been made to avoid double counting of roundwood and residuals. For example, the production of chips and residues (sawdust and shavings) by the wood industries has been allocated to pulp mills, board plants and export markets on the basis of known product flows.

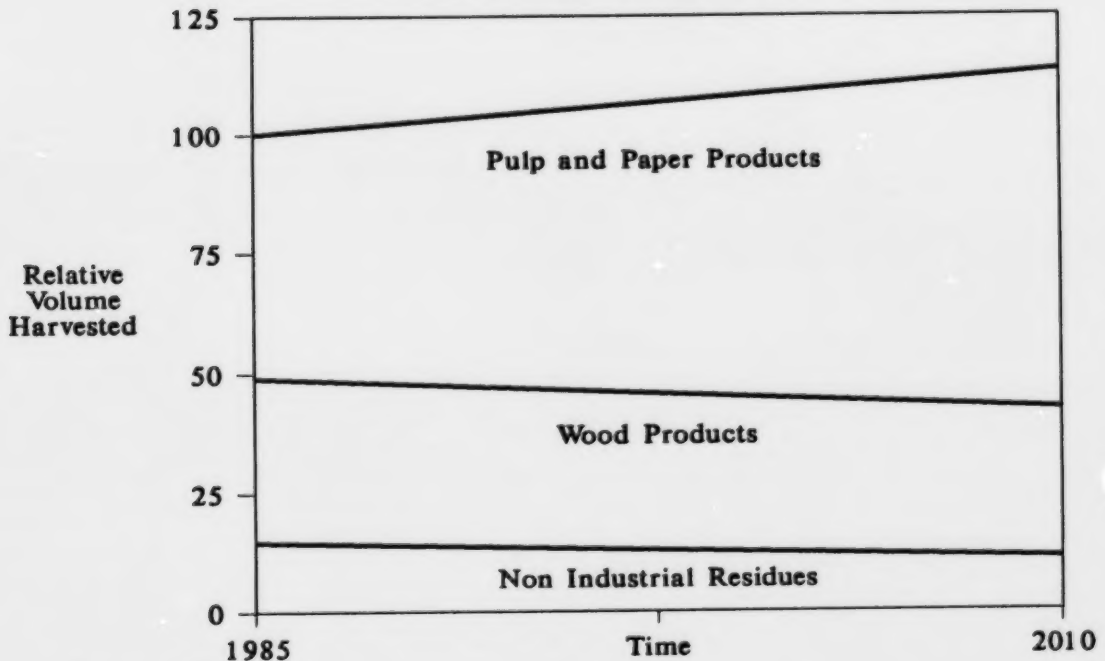
IMPLICATIONS OF THE VOLUME V ANALYSIS

Apparent Limitations on Manufacturing Sector Growth

Although the magnitude of Canada's apparent fibre reserve is about equal to the roundwood production increment that was experienced during the 1975-1985 period, its composition is significantly different. Whereas the historical increment was 87% softwood, the economically available fibre surplus is expected to be about 74% hardwood. This suggests that Canada's ability to continue to expand production of traditional commodities such as softwood dimension lumber and bleached softwood kraft pulps will be severely limited. Given Canada's pre-eminent position in world trade in these two products, and our impending inability to maintain market share due to increasing scarcity of traditional fibre supply, all indications are that the real cost/value of softwood fibre will increase. As fibre values increase, there will be a corresponding expansion of the economic margin. This expansion of the margin will be not only in terms of stands/forests which are now submarginal, but will also bring into the fibre production stream material which is now left behind during logging operations (better utilization). Much of this submarginal material is, however, more suitable for wood pulps (i.e. production of chips) than it is for dimension lumber. Consequently, Canada's ability to produce additional volumes of softwood pulps (either chemical, chemi-mechanical or mechanical) is likely higher than the timber supply data would suggest. On the other hand, the apparent constraint on softwood lumber production could be very realistic. The anticipated change in the level of the Canadian softwood timber harvest and, more importantly, the shift in the use of this harvest is portrayed in Figure 2.

The geographic distribution of the softwood fibre reserve also has important implications for the future structure of the forest industries of Canada and in particular that of the pulp and paper sector. According to the timber supply/demand data gathered in the course of this study, Quebec and the Atlantic provinces have all but reached the limits of their softwood fibres supplies. Ontario and the Prairie provinces have the bulk of the fibre reserve. Consequently, the centre of gravity for the newsprint industry is expected to shift westward. In British Columbia, the existing harvest contributes some 5 million m³ per year in log and chip exports which, in theory, would be available for new domestic manufacturing capacity. Alberta too has potential which is only just beginning to be developed industrially.

Figure 2
Projected Trends in Softwood Timber Harvest
and Sectoral Distribution 1985-2010

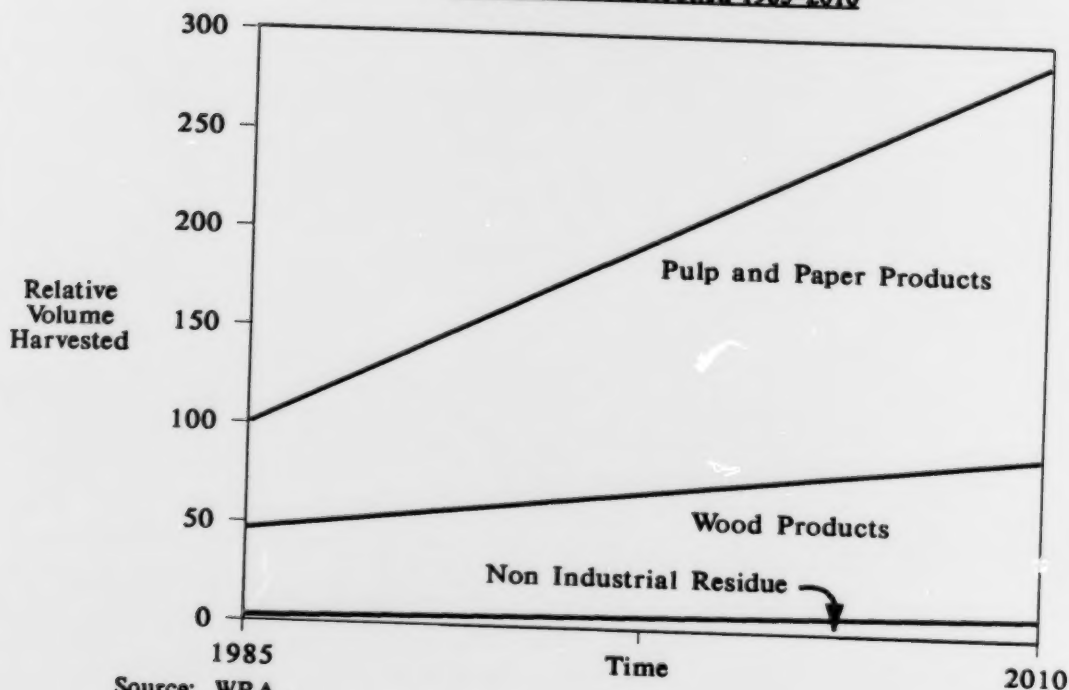


Source: WRA

Fortunately for Canadian industry, the trend in the industrialized economies is towards a greater dependency upon hardwood white chemical pulps and mixedwood (e.g. spruce-aspen) chemi-mechanical pulps. Hardwood timber reserves and in particular the relatively untapped supply of poplar and birch, will allow the pulp and paper sector to take some considerable advantage of this market-driven trend. The expected direction in hardwood timber supply and utilization is illustrated in Figure 3.

The timber supply analysis provided in this Volume demonstrates that the timber harvest cannot continue to grow at historic levels. As a result, the opportunities for new primary manufacturing facilities are limited and the key to future expansion lies in making better use of the fibre supply through more complete utilization, application of higher yield processing technologies and further integration into value-added manufacturing. When choosing between primary manufacturing alternatives, emphasis should be placed upon achieving the maximum product yield which is consistent with resource quality, technological efficiency and market return.

Figure 3
Projected Trends in Hardwood Timber Harvest
 and Sectoral Distribution 1985-2010



Summary of Canadian Fibre Supply

The Canadian timber harvest increased by 54 million m³ per year or 46% during the 1975-85 decade. Of this increment, 87% was softwood and 13% was hardwood. Sawmill expansions in the BC Interior led the way and this region accounted for 40% of the additional softwood harvest. Ontario, Quebec and the BC Coast, with softwood increments of 18%, 16% and 15% respectively, were the next most important growth regions. Of all the regions, Ontario experienced the highest rate of growth - 6.1% per year as compared to the Canadian average of 3.7%.

Although the hardwood harvest increased by nearly 70%, the volume increment was only 7 million m³. Of this, about half was fuelwood. Regional data are given in Table 1.

Table 1
Canadian Timber Supply Trends
(million m³)

	Timber Harvest						1975-85			Average		
	1975			1985			Volume Inc.			1975-85 Growth		
	Swd	Hwd	Total	Swd	Hwd	Total	Swd	Hwd	Total	Swd	Hwd	Total
British Columbia												
Coast	21.1	0.3	21.4	28.2	0.2	28.4	7.1	(0.1)	7.0	2.9	0.0	2.9
Interior	31.9	0.3	32.2	50.9	0.2	51.1	19.0	(0.1)	18.9	4.8	0.0	4.7
Prairies	8.4	0.9	9.3	9.9	1.9	11.8	1.5	1.0	2.5	1.7	7.8	2.4
Ontario	11.0	3.2	14.2	19.9	7.8	27.7	8.9	4.6	13.5	6.1	9.3	6.9
Quebec	24.2	4.2	28.4	31.7	4.8	36.5	7.5	0.6	8.1	2.7	1.3	2.5
Atlantic	11.2	1.9	13.1	14.3	2.9	17.2	3.1	1.0	4.1	2.5	4.3	2.8
Canada ¹	107.8	10.8	118.6	154.9	17.8	172.7	47.1	7.0	54.1	3.7	5.1	3.8

¹ Excluding the Yukon and NWT

Source: Statistics Canada, WRA Data Base

The vast majority of Canada's forests are owned by the provinces and, as a result, forest management regimes including the method used for calculation of allowable annual cuts (AAC's) vary from one jurisdiction to another. Since AAC's are each province's determination of the allowable harvest from Crown lands, the methods employed are not consistent. Despite these inconsistencies, aggregation of provincial AAC's to a national total is a meaningful exercise.

The AAC's as shown in Table 2 relate only to those forest lands which are now considered to be within the margin of economic operability. Excluded areas and their potentially available AAC's are discussed separately in the relevant provincial analyses.

Since 1985 (the most recent year for which Canadian harvest data are available) there has not only been increased capacity utilization at established conversion facilities, but new plants have also been brought online. Consequently, timber surplus estimates which are based solely upon the AAC and the 1985 harvest would be misleading. In an effort to arrive at a more realistic determination of the apparent timber surplus, fibre demand estimates (including those new facilities that were in production by the end of 1987) derived from the Woodbridge Reed data base have been used in Table 2. On this basis, Canada's apparent timber surplus from forests within the economic margin is estimated to be approximately 50 million m³ per year.

Table 2
Canada
Allowable Annual Cut, Estimated Current
Demand and Apparent Timber Surplus
 (million m³ per year)

	AAC			1988 Demand Estimate			Apparent Surplus or (Deficit)		
	Swd	Hwd	Total	Swd	Hwd	Total	Swd	Hwd	Total
British Columbia									
Coast	30.9	0.5	31.4	33.5 ²	0.3	33.8	(2.6) ⁴	0.2	(2.4)
Interior	47.8	4.7	52.5	46.4 ³	0.7	47.1	1.4 ⁵	4.0	5.4
Prairies	20.8	14.9	35.7	11.0	3.0	14.0	9.8	11.9	21.7
Ontario	27.0	16.9	43.9	21.2	7.8	29.0	5.8	9.1	14.9
Quebec	32.5	15.0	47.5	34.5 ⁶	5.9	40.4	(2.0)	9.1	7.1
Atlantic	15.7	6.5	22.2	14.8	3.7	18.5	0.9	2.8	3.7
Canada ¹	174.7	58.5	233.2	161.4	21.4	182.8	13.3	37.1	50.4

¹ Excluding Yukon and NWT.

² Includes approx. 4.0 million m³ of chip/log transfers from the Interior to the Coast and 2.5 million m³ of log exports from Coastal forests.

³ Excluding the 4.0 million m³ of chip/log transfers to the Coast.

⁴ The apparent deficit is more than covered by the 4.0 million m³ fibre transfers from the Interior and 2.5 million m³ of log exports.

⁵ Not including 2.5 million m³ of chip exports to Japan and the USA.

⁶ Including 3.6 million m³ of fibre imports.

Source: Statistics Canada, WRA Data Base

Although this incremental supply is about equal to the supply increment recorded during the 1975-85 period, its composition and geographic distribution is quite different. The timber surplus is estimated to be 26% softwood and 74% hardwood, whereas the 1975-85 supply increment was 87% softwood and 13% hardwood. The softwood timber surplus appears to be concentrated in the provinces of Alberta and Ontario while most of the hardwoods are to be found in Ontario, Quebec and Alberta. However, the ensuing provincial discussions reveal that the Alberta and British Columbia surpluses may be greater than the estimates of Table 2 while that in Ontario may be less.

Summary of Canadian Fibre Cost Assumptions

Earlier, we referred to the price elasticity of virgin fibre supply in Canada. Our fibre cost projections are summarized in this section. With the exception of stone groundwood mills, roundwood received by pulp mills must be debarked and chipped prior to use while residual chips are used directly. Consequently, current average delivered costs of softwood and hardwood fibre used by the regional pulp and paper industries has been estimated on a chip equivalent basis.

Regional average chip/roundwood use ratios are given in Table 3. Table 4 contains estimated current average fibre costs and a projection of these costs to 1995 and 2010. All cost estimates are in constant 1988 Can. dollars per bone dry metric tonne (BDMT).

Table 3
Estimated Chip to Roundwood Fibre Use
Ratios for the Regional Pulp & Paper Industries
 (% total use)

	<u>Softwood</u>		<u>Hardwood</u>	
	<u>Chips¹</u>	<u>Roundwood</u>	<u>Chips</u>	<u>Roundwood</u>
BC Coast	75	25	--	100
BC Interior	98	2	--	---
Prairies	45	55	--	100
Ontario	37	63	18	82
Quebec	50	50	43	57
Atlantic	23	77	7	93
Total Canada	55	45	23	77

¹ Includes other residues such as sawdust
 Source: WRA Data Base

Table 4
Estimated Current and Projected Future
Average Fibre Costs by Region
 (1988 C\$/BDMT)

	<u>1988</u>		<u>1995</u>		<u>2010</u>	
	Swd	Hwd	Swd	Hwd	Swd	Hwd
British Columbia						
Coast	85	90	110	110	125	115
Interior	75	--	85	85	105	105
Prairies	70	85	80	95	90	100
Ontario	115	90	120	90	130	100
Quebec	120	85	125	90	140	95
Atlantic	100	80	105	85	110	95

• Delivered basis

Source: WRA Data Base

In the remainder of this volume, we summarize our regional fibre supply assumptions.

REGIONAL ANALYSIS

British Columbia

The AAC in British Columbia is largely predicated upon the harvesting of sawlog quality softwood timber. That is, most softwood stands that contain a high proportion of low quality timber (e.g. high degree of defect, very small size, poor form, etc.) have been excluded from the resource base used in the AAC calculation. Environmentally sensitive forest lands and those which are economically inaccessible have also been excluded.

Because of an historic lack of interest in their industrial use, stands which are predominantly hardwood have also been left out of the AAC resource base. Recent interest in the utilization of aspen timber for the production of waferboard/OSB and mixedwood (e.g. spruce/aspen) bleached CTMP has prompted a reappraisal of hardwood resources. Some preliminary estimates of the potential AAC's for regional hardwood resources have now been made and these calculations are reflected in the data of Table 5.

Table 5
Allowable Annual Cut and Harvest
Estimates for British Columbia
(million m³/year)

	<u>Allowable Annual Cut</u>			<u>Average Timber Harvest</u>			<u>Apparent Surplus or (Deficit)</u>		
	Swd	Hwd	Total	Swd	Hwd	Total	Swd	Hwd	Total
Coast	30.9	0.5	31.4	28.2	0.2	28.4	2.7	0.3	3.0
Interior	47.8	4.7	52.5	50.9	0.2	51.1	(3.1)	4.5	1.4
Province	78.7	5.2	83.9	79.1	0.4	79.5	(0.4)	4.8	4.4

Source: BC Ministry of Forests and Lands, Woodbridge, Reed and Associates

The harvest data of Table 5 show that BC's softwood AAC is fully committed to existing industry and this conclusion is supported by the regional supply/demand estimates of Table 6.

Table 6
British Columbia
Allowable Annual Cut, Current Fibre
Demand and Apparent Timber Balance
 (million m³ per year)

	<u>Allowable Annual Cut</u>			<u>Est. Fibre Demand</u>			<u>Apparent Surplus or (Deficit)</u>		
	<u>Swd</u>	<u>Hwd</u>	<u>Total</u>	<u>Swd</u>	<u>Hwd</u>	<u>Total</u>	<u>Swd</u>	<u>Hwd</u>	<u>Total</u>
Coast	30.9	0.5	31.4	33.5 ¹	0.3	33.8	(2.6)	0.2	(2.4)
Interior	47.8	4.7	52.2	46.4	0.7	47.1	1.4	4.0	5.4
Province	78.7	5.2	83.9	79.9	1.0	80.9	(1.2)	4.2	3.0

¹ Includes log exports

Source: BC Ministry of Forest and Lands, Woodbridge, Reed and Associates

Included in the fibre demand/use estimates shown for the Coastal region (Table 6) are an approximate 4.0 million m³ of logs and sawmill residual chips produced in the Interior. This fibre transfer is reflected in the regional log production data of Table 5. What is not shown in either table is that the Interior industry produces, on average, about 2.5 million m³ per year of sawmill residual softwood chips which are surplus to the needs of the provincial pulp and paper mills. Since these chips are produced from logs used by Interior sawmills, they are included in the Interior softwood fibre demand estimate of Table 6. These chips are now exported to Japan and the US Pacific Northwest (Washington State).

In addition, the Coastal fibre demand estimate includes approximately 2.5 million m³ per year of softwood log exports.

Recent reappraisal of BC's forest resources and allowable annual cuts indicate that there is a substantial fibre reserve in stands that have been excluded from the resource base used for the AAC calculation. The potential AAC that could be supported by the hardwood portion of this reserve is reflected in the data of Table 5. The far larger softwood component is not.

On the Coast, the incremental softwood fibre available from excluded stands that are not contained within environmentally sensitive areas is estimated to be equivalent to a supply of about 2.0 million m³ per year. About 65% of this potentially available volume is in the North Coastal area and much may be economically inaccessible.

The potential incremental softwood timber supply in the Interior is much greater--possibly as high as 8.5 million m³ per year. Although the economic operability of this potential supply is highly dependent upon local conditions and the end use to which it may be put, it is estimated that a significant proportion is economically accessible.

Species Mix in BC

The estimated species mix in the incremental fibre supply is given in Table 7.

Table 7
Estimated Species Mix in the
BC Fibre Surplus¹

	<u>Est. Annual Volume</u>			<u>Estimated Species Mix</u>									
				<u>Softwood</u>						<u>Hardwood</u>			
	<u>Swd</u>	<u>Hwd</u>	<u>Total</u>	<u>S</u>	<u>P</u>	<u>B</u>	<u>C</u>	<u>F</u>	<u>H</u>	<u>D</u>	<u>A</u>	<u>O</u>	
													(%)
(million m³)													
Coast													
Standing Timber	2.0	0.2	2.2	1	-	30	22	2	45	60	-	40	
Chips	-	-	-										
Interior													
Standing Timber	8.5	4.0	12.5	38	37	15	2	5	3	-	75	25	
Chips	2.5	-	2.5	25	44	9	5	14	3	-	-	-	

¹ including lower quality softwood timber not now in the AAC

S = white and Englemann spruce

P = lodgepole pine

B = balsam (true fir)

C = cedar (western red cedar and a very small volume of cypress on the coast)

F = Douglas fir

H = hemlock

D = alder

A = aspen

O = other (poplar sp. other than aspen, birch and maple)

Alberta

Alberta's AAC estimates assume that all inventoried timber on stocked productive forest land is potentially accessible to industry and that it is up to the individual forest enterprise to determine whether or not this timber is economically operable. In the southwestern and north central regions of the province (the south central and south eastern portions of Alberta are not forested) all industrial forest lands can be considered as economically accessible. However, some of the more northerly regions are still beyond the limits of economic operability. For the purposes of this report it has been assumed that the areas and AAC's now committed to industry, plus those regions designated for future development, are indeed accessible. However, only a portion of the unallocated area is operable given existing infrastructure and market conditions. These estimates are given in Table 8.

Table 8
Total AAC and Economic
Operability Estimates for Alberta
 (million m³ per year)

	Committed AAC	AAC Allocated for Development ¹	<u>Unallocated AAC</u>		Net Ec. Accessible	Total AAC
			Operable	Not Op.		
Softwood	9.6	3.6	0.5	0.8	13.7	14.5
Hardwood	1.6	6.9	1.4	1.7	9.9	11.6
Total	11.2	10.5	1.9	2.5	23.6	26.1

¹ Timber Development Areas, potential FMA's and Quota expansions

Source: Alberta Forest Service, WRA Data Base

If it is assumed that the economically accessible AAC in Alberta is in the region of 23-24 million m³ per year, then it appears that less than half of this available supply has been committed to industry (i.e. 11.2 million m³). Of the uncommitted balance, 85% is in areas designated for future development (allocated for development), while the remainder is scattered throughout the accessible forest lands. Within the development areas, 42% of the timber reserve is softwood and 66% is hardwood.

A comparison of the economically accessible AAC, the timber commitment and estimated industrial demand for timber is given in Table 9. Although this table shows that the softwood commitment exceeds current demand, industrial expansions now underway will require new supplies of both softwood and hardwood timber. Consequently, the committed softwood reserve, and about 0.5 million m³ from the allocated hardwood reserve, should be regarded as already required by established industry. This then leaves about 4.1 million m³ of softwood and 7.7 million m³ of hardwood AAC available for new projects. It must, however, be noted that up to 4.5 million m³ of the hardwood reserve and 1.2 million m³ of the softwood reserve could soon become committed to proposed new pulp and paper ventures. When this occurs, the apparent annual reserves for softwood and hardwood could be reduced to 2.9 and 3.3 million m³ respectively.

Table 9
Alberta
Allowable Annual Cut, Timber Commitment,
Estimated Industrial Demand and Timber Reserve
(million m³ per year)

	<u>AAC</u>		<u>Est.</u>	<u>Apparent Timber Reserve</u>			
	<u>Total</u>	<u>Committed</u>	<u>Demand¹</u>	<u>Committed</u>	<u>allo-</u> <u>cated</u>	<u>Other</u>	<u>Total</u>
Softwood	13.7	9.6	7.0	2.6	3.6	0.5	6.7
Hardwood	9.9	1.6	1.7	(0.1) ²	6.9	1.4	8.2
Total	23.6	11.2	8.7	2.5	10.5	1.9	14.9

¹ Assumed to be taken from the committed AAC

² Additional commitments are pending

The pulp industries of Alberta now consume approximately 1.7 million m³ of softwood residual chips while the potential to produce chips is over 2.0 million m³ per year.

Pulp mill expansions now underway will result in chip demands which exceed the potential supply unless there is a significant expansion of the Alberta sawmilling industry.

Finally, a history of severe forest fires in Alberta has resulted in large areas of immature timber. Some of these forests are now nearing maturity so that by the end of the century the softwood AAC may be revised upward by as much as 5 million m³. This potential volume is in addition to the 2.5 million m³ per year of softwood and hardwood timber which has been excluded from the AAC due to inaccessibility.

Species Mix in Alberta

The approximate species mix in the timber reserve is given below. The pine is lodgepole in the western portion of Alberta, jack pine in the east and a hybrid variety in the east central area. Most of the spruce is western white, but a much smaller volume of black spruce occurs in swampy areas. About 85% of the hardwood reserve is aspen and most of the remainder is balsam poplar. A small volume of white birch is also found.

Table 10
Estimated Species Mix in the Apparent Timber Reserve

Softwood	%	Hardwood	%
White spruce	55	Aspen	85
Lodgepole & jack pine	34	Balsam poplar & birch	15
Black spruce	8		
Balsam fir	3		
Total	100		100

Saskatchewan and Manitoba

The combined AAC for Saskatchewan and Manitoba is estimated at 15.3 million m³ per year of which 63% is softwood and 37% is hardwood. However, as was the case in Alberta, some of the productive forest land is so remote from established infrastructure that it must be regarded as economically inaccessible. Removal of this land from the forest base results in an operable annual cut estimate of 12.1 million m³ per year and a 59/41 softwood/hardwood split. The data are given in Table 11.

Table 11
Saskatchewan and Manitoba
Total AAC and Operability Estimates
 (million m³ per year)

	<u>Physical AAC</u>			<u>Inaccessible Portion</u>			<u>Operable AAC</u>		
	Sask	Man	Total	Sask	Man	Total	Sask	Man	Total
Softwood	3.7	5.9	9.6	0.4	2.1	2.5	3.3	3.8	7.1
Hardwood	3.0	2.4	5.7	0.2	0.5	0.7	3.1	1.9	5.0
Total	7.0	8.3	15.3	0.6	2.6	3.2	6.4	5.7	12.1

Source: Provincial Forest Services

Demand on the forests of Saskatchewan and Manitoba is estimated at about 5.3 million m³ per year or 44% of the available supply (Table 12).

In Saskatchewan, there is an apparent softwood surplus of 1.1 million m³ per year and a hardwood surplus of 2.0 million m³. Generally speaking, the hardwood resource is well distributed throughout the commercial forest zone and there is a relatively large aspen surplus in most areas. Although there is also an indicated surplus of softwoods, Saskatchewan suffers from regional shortages of sawlog quality timber in areas close to wood product plants. To meet the size and quality requirements at existing sawmills and the one veneer/plywood plant, larger logs must be sorted from woods-run pulpwood and transported long distances across the province.

Table 12
Saskatchewan and Manitoba
Operable AAC, Estimated Demand
and Apparent Timber Surplus
 (million m³ per year)

	<u>Operable AAC</u>			<u>Estimated Demand</u>			<u>Apparent Surplus</u>		
	Sask	Man	Total	Sask	Man	Total	Sask	Man	Total
Softwood	3.3	3.8	7.1	2.2	1.8	4.0	1.1	2.0	3.1
Hardwood	3.1	1.9	5.0	1.1	0.2	1.3	2.0	1.7	3.7
Total	6.4	5.7	12.1	3.3	2.0	5.3	3.1	3.7	6.8

Source: Provincial Forest Services

The apparent timber surplus in Manitoba is larger than that indicated for Saskatchewan and more evenly divided between softwood and hardwoods. However, the softwood surplus is quite scattered throughout the commercial forest zone. Although hardwoods can be found in more localized concentrations, it is likely that the more readily accessible portions of both the hardwood and softwood surpluses are more suited for incremental expansions at existing pulp/paper mills than for greenfield installations. The same situation prevails in Saskatchewan.

Species Mix in Saskatchewan and Manitoba

The estimated species mix in the apparent timber surplus of Saskatchewan and Manitoba is given in Table 13.

Table 13
Estimated Species Mix
in the Apparent Timber Reserve
(%)

	Sask.	Man.
Softwoods		
Jack pine	54	38
Black spruce	43	48
White spruce	¹	11
Balsam fir	3	3
Total	100	100
Hardwoods		
Aspen	80	78
Balsam poplar	17	12
Others (mainly birch)	3	10
Total	100	100

¹ This species is considered to be fully utilized in Saskatchewan.

Source: WRA Data Base

Ontario

Unlike other provinces, Ontario does not have an allowable annual cut. The harvest from Crown forest lands is controlled on an area basis according to a system known as Maximum Allowable Depletion (MAD). MAD's are determined for successive five-year periods according to the area specific management plans, and are designed to allow for forest depletion from all sources (i.e. harvesting, fires, pathogens, etc.). In order to translate MAD's into estimates of allowable timber harvests, it is first necessary to determine regional average gross timber yields by species group and then deduct appropriate allowance for nonharvesting losses (i.e. fires, etc.). This exercise has been done for the Crown forest lands of Northern Ontario and the Algonquin Region. These Crown forest lands account for 80% of the province's productive forest land base. Most of the remaining productive forest land is privately owned and 76% is located in the northeastern and southern portions of the province.

Due to a lack of adequate data it has not been possible to estimate an AAC for the private forests of Ontario. For the purposes of this report it has been assumed that the recorded cut from private forests is in approximate balance with the AAC. Consequently, all of the estimated timber surplus in Ontario is assumed to be located on the Crown lands of Northern Ontario and the Algonquin region. These estimates are shown in Table 14.

Table 14
Ontario
Estimates for the AAC, Timber
Demand and the Timber Reserve
(million m³ per year)

	AAC Est.	Demand Est.	Apparent Surplus
Softwood	27.0	21.2	5.8
Hardwood	16.9	7.8	9.1
Total	43.9	29.0	14.9

Source: OMNR resource data, WRA estimates

Although Ontario has an apparent Crown timber surplus of about 15 million m³ per year, there is some question as to whether or not all of the indicated 5.8 million m³ per year of softwood timber is actually available for a new enterprise. Much of this surplus softwood is contained within Forest Management Agreement (FMA) areas. FMA's are renewable, long term, area-based tenures which give the holder the right to utilize the full harvest from the FMA area. If a timber surplus exists within an FMA (i.e. the allowable harvest exceeds the holder's requirements) then all or a portion of this surplus may be allocated to others under Third Party Agreements. The holder of a Third Party Agreement (if a sawmill) may in turn be required to send an equivalent volume of chips to a designated pulp mill. Also, a significant portion of the 5.8 million m³ softwood surplus may be made up of many small volumes, each of which on its own does not offer sufficient volume for a new processing facility.

Species Mix in Ontario

The estimated species mix in the apparent timber surplus is given in Table 15.

Table 15
Approximate Species Mix
in the Ontario Timber Surplus
(%)

Softwoods		Hardwoods	
White & black spruce	72	Poplar sp. (mainly aspen)	55
Jack pine	10	White birch	42
Balsam fir	13	Others	3
Others	5		
Total	100	Total	100

Quebec

In Quebec, Crown forests occupy 85% of the accessible production portion of the commercial forest. About 78% of this area is considered to be economically exploitable and, within this exploitable portion, Crown forests account for 75% of the area and private forests the remaining 25%. However, in terms of growing stock, the private forests contain only 12% of the volume. Since most private forests have been cut-over, the vast majority of the timber (i.e. 68%) is immature and most (56%) is hardwood. Crown forests, on the other hand, are dominated by mature softwood timber types and are the principal source of Quebec's industrial roundwood harvest (78%).

Softwoods comprise 79% of Quebec's growing stock and spruce, jack pine and balsam fir alone account for 73% of this total volume. However, these three softwood species make up 90% of the timber used by the forest industries of Quebec.

As can be seen from Table 16, more than the full softwood allowable annual cut estimated for Quebec's economically exploitable forests can be utilized by the province's forest industries. At present, a supply/demand balance is being achieved through the importation of about 3.6 million m³ per year. Regional analysis shows that the softwood component of the public forest is overcommitted in the administrative zones of Quebec and Lac St.-Jean and in the central portion of Abitibi-Temiscamisque. This softwood overcommitment is especially true for spruce, jack pine and balsam fir.

Although the provincial hardwood resource appears to be significantly underutilized, the poplar component (primarily aspen) is heavily committed to existing industry. The bulk of the indicated hardwood surplus is in the white birch, maple and other hardwood species groups.

Table 16
Quebec
Allowable Annual Cut, Estimated
Timber Demand and Apparent Surplus
 (million m³ per year)

	AAC	Estimated Demand	Apparent Surplus or (Deficit)
Softwood	32.4	34.5	(2.0)
Hardwood	15.0	5.9	8.9
Total	47.4	40.4	6.9

* including 3.6 million m³ of fibre imports

Source: Quebec MER, WRA Data Base

Although the recorded softwood timber harvest in Quebec has not exceeded 32 million m³ (1985), WRA analysis of 1986/87 production of forest products indicates that the Quebec forest industries now consume about 34.1 million m³ of softwood fibre and 3.8 million m³ of hardwood fibre on an annual basis. The remaining 3.5 million m³ per year is fuelwood of which 84% is hardwood.

Provisions of Quebec's new forest policy and Forest Act are designed to prevent an overcommitment of Crown forest resources. The new Forest Act designates roundwood from the Crown forests as a supplementary supply to the timber available from private forests, the domestic supply of chips, sawdust and shavings, plus wood from outside Quebec. What this means in practical terms is that new pulp ventures in Quebec should be based upon softwood chips and/or hardwood pulpwood. In certain regions, softwood pulpwood may also be available.

Species Mix in Quebec

Although the above analysis indicates that there is no softwood surplus in Quebec, there are site-specific opportunities for the utilization of chips in combination with hardwoods (e.g. the Val d'Or area of the Abitibi region). Softwood chips are, in general, a mixture of spruce, jack pine and balsam fir. The approximate species mix in the hardwood timber reserve is as follows:

Species/Species Group	%
White birch	37
Yellow birch	15
Poplar sp. (mainly aspen)	18
Maples (mainly sugar maple)	25
Others	5
Total	100

Atlantic Region

Unlike the other regions, private owners account for a large share of the Maritime forest. In Nova Scotia more than 70% of the forest land is privately owned and in New Brunswick more than 50%. Nearly all of the Prince Edward Island forest is privately held. Much of the private forest land of the Maritimes is held in small parcels. Hence, the annual harvest is strongly affected by the objectives of private owners, rather than government policy on AAC and forest management. Although most of Newfoundland's productive forest is Crown land, much is controlled by the pulp and paper industry and this acts as a constraint to any future change in the industrial utilization of the forest.

With a total AAC of 22.2 million m³ and an average harvest of 17.0 million m³, the Atlantic provinces have an apparent fibre surplus of 5.2 million m³ per year. That is, approximately 77% of the total available AAC is utilized. Fuelwood makes up 5% of the softwood harvest and 42% of the hardwood harvest. Table 17 provides a breakdown of these figures by province.

Table 17
Atlantic Region
Allowable Annual Cut, Average Harvest
and Apparent Timber Reserve
 (million m³ per year)

	AAC	Average Harvest	Indicated Surplus or (Deficit)
Softwoods			
New Brunswick	6.7	7.6	(0.9)
Nova Scotia	5.5	3.7	1.8
PEI	0.3	0.2	0.1
Newfoundland	3.2	2.8	0.4
Total	15.7	14.3	1.4
Hardwood			
New Brunswick	3.9	1.1	2.8
Nova Scotia	2.4	1.4	1.0
PEI	0.2	0.2	0.0
Newfoundland	n.a.	0.1	n.a.
Total	6.5¹	2.7¹	3.8¹

n.a. not available. Nfld. does not have a hardwood AAC
¹ excluding Nfld.

Source: Provincial Forest Services

Previous analyses done in the early 1980s had showed softwood deficits in New Brunswick and Nova Scotia and predicted a softwood shortage for Newfoundland¹. The data of Table 17 shows that the New Brunswick deficit persists but that the shortage in Newfoundland has not occurred. Reevaluation of Nova Scotia's forest resources has resulted in a significant upward revision in the AAC estimate so that this province now appears to have a softwood surplus. However, small freeholds account for 52% of Nova Scotia's forest land and, of the approximate 30,000 owners of small private woodlots, less than half sell their timber. This suggests that timber available for harvesting may be less than the volume shown in the AAC.

¹ Market Mechanical and Chemi-Mechanical Pulps, Woodbridge, Reed and Associates, 1982.

Although the hardwood surplus in New Brunswick and Nova Scotia is equal to 60% of the AAC, the incidence of small private woodlots in both provinces has an inhibiting effect upon commercial timber supply.

A comparison of apparent timber demand (based on installed capacity and 1986/87 production) and the AAC in the Atlantic provinces shows that the timber surplus for both softwoods and hardwoods may be smaller than that which has been indicated by average harvest data (Table 17 and Table 18).

Table 18
Atlantic Region
Allowable Annual Cut, Estimated Demand
and Apparent Timber Surplus
(million m³ per year)

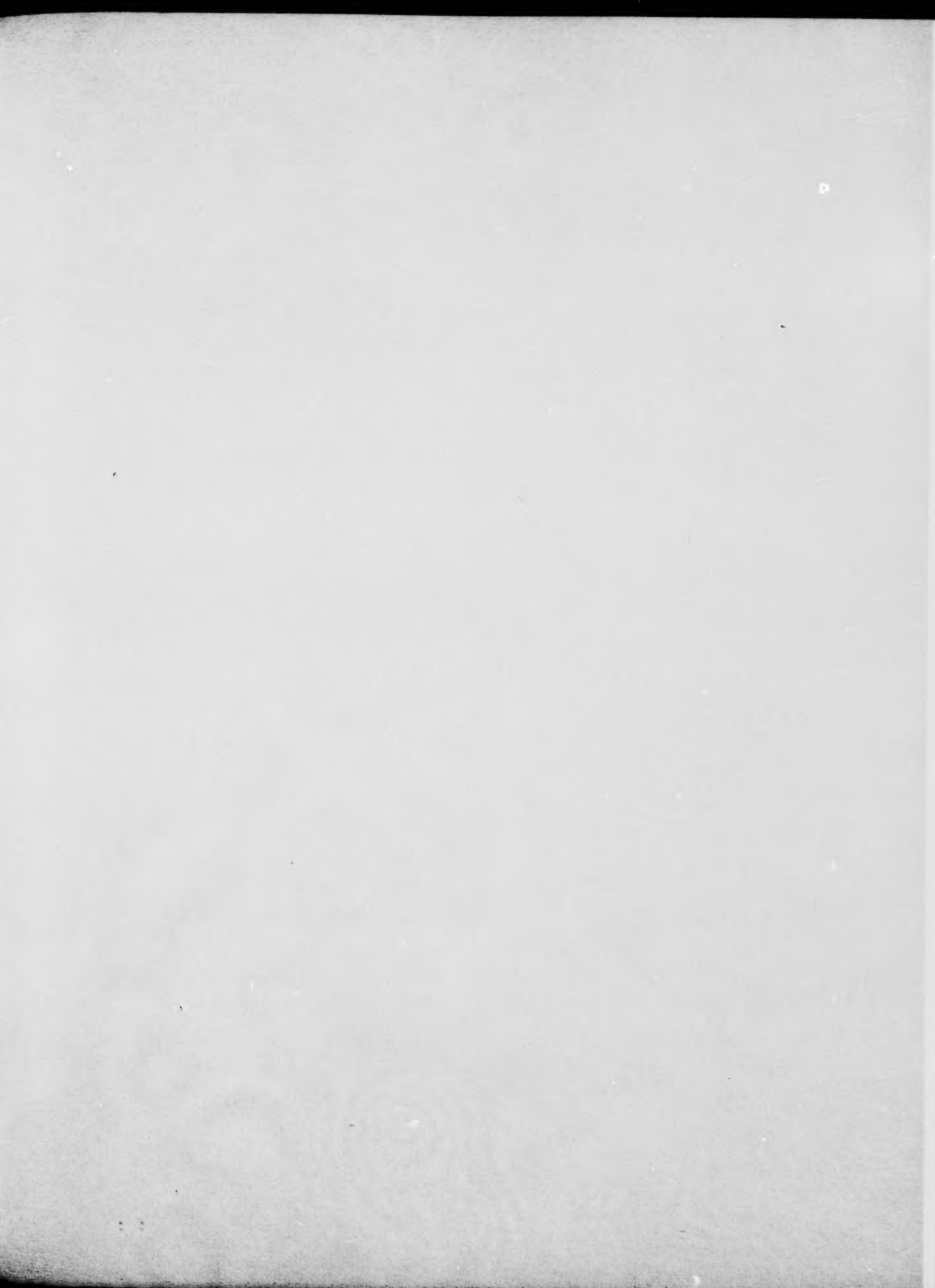
	AAC	Est. Timber Demand	Apparent Surplus
Softwood	15.7	14.8	0.9
Hardwood	6.5	3.7	2.8
Total	22.2	18.5	3.7

Source: WRA Data Base

Species Mix in Atlantic Region

The estimated species mix in the indicated timber surplus of the Atlantic region is as follows:

Softwoods	%	Hardwoods	%
Spruce	55	Maples	50
Balsam fir	30	Birches	25
Pines	8	Aspen	15
Hemlock	5	Beech	6
Others	2	Others	4
Total	100	Total	100





APPENDIX I

CANADIAN AND REGIONAL FIBRE SUPPLY - DETAILS

The purpose of this appendix is to provide a brief summary of Canada's timber resources, on a regional and aggregate basis. Each region's wood volume is quantified, as well as the Allowable Annual Cut (AAC), the average harvest and the implied surplus or deficit in softwood and hardwood. Note, however, that the implied surplus (deficit) shown in this appendix has been based upon recorded harvests rather than the fibre demand estimates used in the preceding section of this report. As pointed out in that section, the current capacity to utilize fibre is somewhat higher than the historic harvest.

The data used here were provided by provincial forest resource management authorities, G.M. Bonnor's Canada's Forest Inventory 1981 and the WRA data base. The most recent provincial data available were used.

Canada

Introduction

Canada is the world's primary forest nation, and the largest exporter of forest products. In 1987, the forest product industry contributed \$7.3 billion to the Canadian merchandise trade surplus of \$11.6 billion.

Canada's stature in the forest products market results from the extensive utilization of its enormous resources. A large proportion of Canada's land area is forested. Excluding the Northwest Territories and the Yukon, Canada has a total land area of 5.4 million km². Some 65% of this (3.5 million km²) is classified as forest land. Table I-1 provides a regional summary of Canada's wood volume on stocked, productive and nonreserved forest land. Of this total standing timber volume of 18.9 billion m³, almost 80% is softwood, while the remainder is hardwood.

Table I-1
Canadian Wood Volume
By Province or Region*
 (millions of m³)

	Softwood	Hardwood	Total
Atlantic Provinces	926	288	1,214
Quebec	3,089	1,044	4,133
Ontario	2,075	1,123	3,198
Prairies	1,513	1,044	2,557
BC	7,438	404	7,842
Total	15,041	3,903	18,944

* gross merchantable volume on stocked, productive, nonreserved forest land

With respect to the wood volume on all of Canada's stocked, productive and non-reserved forest land, the most common softwood species are spruce, pine and fir. These make up three-quarters of total softwood. Aspen and other poplar species comprise 55% of all hardwood.

Provincial ownership accounts for the largest share of the forest land in Canada. The Provincial Crown owns approximately 90% of Canada's inventoried forest; 2% is owned by the Federal Crown, while the remaining 8% is privately owned. The highest share of privately owned forests are found in the provinces of Prince Edward Island, Nova Scotia and New Brunswick. Some 60% of the forests in these provinces is privately owned, while most of the forests in the remaining provinces fall under provincial ownership.

AAC, Harvest and Implied Surplus

Allowable Annual Cut (AAC) is defined as the volume of wood fibre that may be harvested annually on a sustainable basis over a specified period of time from a specific forest area. The objective is to achieve an approximate balance between harvest and net growth, in order to attain continuous production. Each of the provinces has a different method of computing the AAC because of varying forest management regimes, differing age class distributions of forests and several other factors. While some minor problems of consistency may exist, it is still acceptable to sum the AAC's across provinces to arrive at a total for Canada.

For the purposes of this report, only the AAC for forests which are now considered to be economically operable are included in the timber supply. Wood fibre beyond the economic margin in each region is excluded from our computations of the AAC.

Tables I-2 to I-4 provide the AAC and harvest figures for all of Canada and each major subregion. Despite changes in provincial softwood AAC's, the total Canadian AAC for all softwood species has remained relatively unaltered at 175 million m^3 over the past decade. The current hardwood AAC is 58.5 million m^3 , a slight increase from the earlier figure of 54.0 million m^3 . Canada presently has a total AAC of 233 million m^3 .

In 1985, the total roundwood harvest in Canada was about 175 million m^3 . Note, however, that this figure includes fuelwood, which accounts for 5% of the total. About 90% of production, or 157 million m^3 , was softwood, while 18 million m^3 was hardwood. Given these AAC and harvest figures, Canada has an apparent softwood surplus of 18 million m^3/y , and a hardwood surplus of 41 million m^3/y . Thus, in total, Canada has an apparent wood surplus of 59 million m^3 , which represents a utilization rate of 76%.

These overall figures mask the fact that, in certain subregions, harvesting commitments may exceed the longer term sustainable supply of softwoods. However, almost all provinces, in particular Alberta, Ontario and Quebec, have a considerable surplus of hardwood.

Table I-2
Canadian Regional Softwood Harvest and Allowable Annual Cut
 (millions of m³)

	AAC	Harvest	Indicated Surplus/ Deficit	Surplus/ Deficit as % of AAC
Atlantic	15.7	14.3	1.4	9
Quebec	32.5	31.7	0.8	2
Ontario	27.0	19.9	7.1	27
Prairies	20.8	11.8	9.0	43
BC				
Coast	30.9	28.2	2.7	9
Interior	47.8	50.9	(3.1)	(6)
Subtotal	78.7	79.1	(0.4)	n.s.
Total	174.7	156.8	17.9	10
Fuelwood		2.0		
Industrial Roundwood		154.8		

n.s. not significant

Source: Provincial statistics; Statistics Canada; WRA data base

Table I-3
Canadian Regional Hardwood Harvest and Allowable Annual Cut
 (millions of m³)

	AAC	Harvest	Indicated Surplus/ Deficit	Surplus/ Deficit as % of AAC
Atlantic	6.5	2.9	3.6	55
Quebec	15.0	4.8	10.2	68
Ontario	16.9	7.8	9.1	54
Prairies	14.9	1.7	13.2	88
BC ¹				
Coast	0.5	0.2	0.3	60
Interior	4.7	0.2	4.5	96
Subtotal	5.2	0.4	4.8	92
Total	58.5	17.6	40.9	70
Fuelwood		5.9		
Industrial Roundwood		11.7		

¹ the estimated potential hardwood AAC

Source: Provincial statistics; Statistics Canada; WRA Data Base

Table I-4
Canadian Regional Total Harvest and Allowable Annual Cut
 (millions of m³)

	AAC	Harvest	Indicated Surplus/ Deficit	Surplus/ Deficit as % of AAC
Atlantic	22.2	17.2	5.0	23
Quebec	47.5	36.5	11.0	23
Ontario	43.9	27.7	16.2	37
Prairies	35.7	13.5	22.2	62
BC ¹				
Coast	31.4	28.5	2.9	9
Interior	52.5	51.0	1.5	2
Subtotal	83.9	79.5	4.4	5
Total	233.2	174.4	58.8	25
Fuelwood		7.9		
Industrial Roundwood		166.5		

¹ including the estimated potential hardwood AAC

Source: Provincial statistics; Statistics Canada; WRA data base

Fibre Supply in the Atlantic Provinces

The forests of the Maritime region--that is, New Brunswick, Nova Scotia and Prince Edward Island--are all within the Acadian Forest Region while Newfoundland lies within the Boreal Forest Region. Nova Scotia and New Brunswick are heavily forested (over 80% of the total land area) while Prince Edward Island has approximately 52% of its land area forested. In total, there are 10.3 million hectares (ha) of forest land in the Maritimes, with a fibre volume of 751.6 million m³. Newfoundland and Labrador have 7.4 million ha of productive forest land, with a total timber volume of 463 million m³. In total, the Atlantic provinces have 23.0 million ha of forest land, with a total wood volume of 1.2 billion m³.

Most of the Maritime forests (94%) are productive and all are economically accessible. New Brunswick and Nova Scotia have similar species compositions in their forests. In both provinces, softwood accounts for approximately two-thirds of growing stock. Spruce and balsam are the predominant softwood species, while red maple is the principal hardwood.

Softwood makes up a larger share of Newfoundland's forests, accounting for 87% of the Island's timber volume and 96% of that in Labrador. Black spruce and balsam fir are the primary softwood species, while white birch is the predominant hardwood.

Unlike the other provinces, private owners account for a large share of the Maritime forests. In Nova Scotia more than 70% of the forest land is privately owned and in New Brunswick more than 50%. Nearly all of the Prince Edward Island forest is privately owned. Much of the privately owned land of the Maritimes is held in small parcels. Hence, the annual harvest is strongly affected by the objectives of private owners, instead of government policy on AAC and forest management. Although most of Newfoundland's productive forest is Crown land, much is controlled by the pulp and paper industry and this acts as a constraint to any future change in the industrial utilization of the forest.

With a total AAC of 22.3 million m³ and an average harvest of 17.2 million m³, the Atlantic provinces have an apparent fibre surplus of 5.0 million m³/y. That is, approximately 77% of the total available AAC is utilized. (Fuelwood makes up 5% of the softwood harvest and 42% of the hardwood harvest.) Table I-5 provides a breakdown of these figures by province.

A brief summary of each Atlantic province's forestry situation follows.

Table I-5
Atlantic Provinces: Average Harvest and Allowable Annual Cut, 1986
(thousands of m³)

	AAC	Average Harvest	Indicated Surplus	Surplus or Deficit as % of AAC
Softwood				
New Brunswick	6,700	7,595	(895)	(13)
Nova Scotia	5,500	3,709	1,791	33
Prince Edward Island	300	181	119	40
Newfoundland	3,239	2,811	428	13
Total	15,739	14,296	1,443	9
Fuelwood		575		
Industrial Roundwood		13,721		
Hardwood				
New Brunswick	3,900	1,120	2,780	71
Nova Scotia	2,420	1,440	980	40
Prince Edward Island	225	234	(9)	(4)
Newfoundland	*	78	*	*
Total	6,545	2,872	3,673 ¹	55
Fuelwood		1,193		
Industrial Roundwood		1,679		

¹ excludes Newfoundland

* Hardwood AAC not calculated for Newfoundland

Source: Canada's Forests: A Commitment to the Future, National Forest Congress 1986; Provincial Reports; Economic Forestry Statistics 1987, Government of Canada.

New Brunswick

Introduction

Of a total land area of 7.1 million ha, 89% (or 6.3 million ha) of New Brunswick's land is forested; of these forests, 96% is productive.

New Brunswick has a total softwood growing stock of 337 million m³. Spruce makes up approximately 47% of softwood volume and balsam 35%. Red maple is the most predominant hardwood species (25%), followed by sugar maple (19%), aspen (18%) and several other hardwoods.

Small freehold ownership accounts for one-third of New Brunswick's forest lands. The Crown retains ownership of 48% of forests and large freehold makes up the remaining 18%.

Allowable Annual Cut, Harvest and Implied Surplus

Table I-6 provides the AAC by tenure for New Brunswick.

Table I-6
New Brunswick Allowable Annual Cut
(thousands of m³)

	Softwood	Hardwood	Total
Crown	3,825.0	1,801.0	5,626.0
Non-indust. Freehold	1,640.9	1,209.0	2,849.9
Indust. Freehold	1,260.0	845.0	2,105.0
Total	6,725.9	3,855.0	10,580.9

New Brunswick's average softwood harvest is 7.6 million m³ and for hardwood it is 1.1 million m³. Fuelwood accounts for 50,000 m³ of the softwood harvested, and 219,000 m³ of the hardwood harvested. The softwood harvest is slightly higher than at the beginning of the 1980s, while there has been a decrease in the annual hardwood harvest.

New Brunswick shows an apparent softwood deficit of 0.9 million m³, while there is an apparent surplus of 2.8 million m³ in hardwood. Thus the available provincial statistics indicate that the demand for softwood exceeds the currently sustainable supply and this has been a chronic problem. However, only half of New Brunswick's hardwood fibre is utilized and the hardwood reserve has the potential to offset the deficit on softwood. The net indicated fibre surplus for New Brunswick is about 1.9 million m³.

Nova Scotia

Introduction

Approximately 3.7 million ha, or 72%, of Nova Scotia's total land area is productive forest land. Softwood forest types account for 103 million m³ (or 50%) of total wood fibre; hardwood types comprise 18%, and mixedwood the remainder.

Spruce is the primary softwood species in Nova Scotia, comprising 50% of softwood growing stock, while balsam fir is also very important (36%). Minor volumes of red and white pine, jack pine, eastern hemlock and larch are also present in Nova Scotia's forests.

Red maple accounts for 53% of the hardwood growing stock and yellow birch is second most prevalent at 19%. White birch, aspen and some miscellaneous species make up the remaining hardwood volume.

Small freeholds account for 2.1 million m³ of Nova Scotia's forests and in total amount to 52% of the forest land. Large freeholds retain 21% of forests and the remaining 27% is Crown land. Three quarters of Nova Scotia's forests are owned privately--there are approximately 30,000 owners of small, private lots in Nova Scotia and less than 47% of these sell their fibre. This suggests that Nova Scotia's available AAC might be somewhat smaller than the total AAC.

Allowable Annual Cut, Harvest and Implied Surplus

In the late 1970s, Nova Scotia had a serious spruce budworm infestation which reduced its growing stock of timber. In the early 1980s, Nova Scotia established a softwood AAC of 3.3 million m^3 and a hardwood AAC of 1.3 million m^3 .

In recent years, a reevaluation of the provincial forestry situation has led to an upward revision in the allowable annual cut. Nova Scotia's softwood AAC is now calculated to be 5.5 million m^3 , while that of hardwood is 2.4 million m^3 . This yields a total AAC of 7.9 million m^3 . Hence, both softwood and hardwood AAC's have increased as a result of an improvement in the spruce budworm situation and better inventory information.

Over the period 1980-85, the annual harvests were exceptionally low because of the recession and a lengthy strike. There has been a recovery and, at present, the industrial demand for softwood is 3.7 million m^3 and 1.4 million m^3 for hardwood. Fuelwood demand accounts for 46,000 m^3 of softwood and 662,000 m^3 of hardwood. The total harvest is 5.1 million m^3 . This is an increase over the harvest figures of 1982, which were 3.4 million m^3 for softwood and 0.7 million m^3 for hardwood.

Nova Scotia shows a softwood surplus of 1.8 million m^3 , and 1.0 million m^3 of hardwood, for a total surplus of 2.8 million m^3 /y. This is a marked improvement over the earlier figures, when Nova Scotia showed a softwood deficit. Currently, 67% of its potentially available softwood and 60% of its hardwood is being utilized.

In 1986, Nova Scotia established a new forest policy and Forests Act with the objective of doubling its timber harvest by 2025.

Prince Edward Island

Introduction

Prince Edward Island is a small landmass relative to the other three Atlantic provinces, comprising only 1.9% of the Atlantic land area and 1.2% of the forests. Some 280,000 ha (52%) of Prince Edward Island's land area is forest land and all of this is classified as productive.

Approximately 104,000 ha (or 37%) of Prince Edward Island's forests are softwood--the predominant species are spruce, balsam fir and larch. About 81,000 ha (29%) of the forests are hardwood, primarily red oak, yellow birch, white birch and red maple. Prince Edward Island's total growing stock of softwood and hardwood amounts to 33.3 million m³ - 35% of this is in softwood forest types, 35% is in hardwood and the remainder is mixed wood. A large proportion (87%) is owned by small freehold.

Allowable Annual Cut, Harvest and Implied Surplus

Prince Edward Island's AAC is estimated at 525,000 m³. Softwood makes up 300,000 m³, while the hardwood AAC is estimated to be 225,000 m³.

The figures in Table I-5 show that 181,000 m³ of softwood was harvested in 1986; 35,000 m³ of this was for pulpwood, 67,000 m³ was used as logs and bolts, and 79,000 m³ was utilized as fuelwood. The hardwood harvest of 234,000 m³ was almost entirely for the purposes of fuelwood. The total harvest amounted to 415,000 m³. Prince Edward Island is the only province in which the amount of hardwood harvested exceeded that of softwood. It shows a small deficit in hardwood and a 40% surplus in softwood.

Newfoundland Fibre Supply

Introduction

Newfoundland and Labrador have a total land area of 17.4 million ha. Insular Newfoundland takes up 58% of this and Labrador accounts for the rest. Newfoundland Island has 6.2 million ha of forest, approximately 61% of which is productive. Labrador has a productive forest area of 3.6 million ha (56%) out of a total 6.5 million ha.

The forests of Newfoundland and Labrador all lie in the Boreal Forest Region which extends itself in a continuous belt across Northern Canada. Both on the Island and in Labrador, softwood accounts for the largest share of forest. It comprises 87% of the volume on the Island and 96% in Labrador. On the Island, balsam fir and black spruce are the predominant softwood species, while white spruce and larch occur as minor species. Black spruce is dominant in Labrador. White birch is the most important hardwood in both regions. All of the forests on the Island are accessible, while the forests of Labrador are considered economically inaccessible.

Newfoundland and Labrador have a gross merchantable timber volume of 463 million m³. Softwood makes up 93% of this (429 million m³), while hardwood accounts for the remainder (34 million m³).

A large share of the productive forests on Newfoundland Island are licensed to the forest industry. Freehold and leased lands account for more than half of the Island's productive forest lands. The leases are long term--either renewable in perpetuity--or covering a 99 year term with about 40 years to run.

Allowable Annual Cut, Harvest and Implied Surplus

Earlier estimates of the softwood AAC for Newfoundland Island were just under 3.0 million m^3 for the period 1980-1984 with a projected small increase in 1985 under various scenarios of forest protection. For all scenarios, projections of the estimated wood demand exceeded the AAC in all years after 1985, implying a pending chronic softwood deficit. Although there is a considerable supply of softwood in Labrador, most of this region is excluded from calculations of surplus fibre. Newfoundland's most recent AAC figures are shown in Table I-5.

Keeping in mind that the AAC figures are for softwood only (none are calculated for hardwood), Newfoundland has a total AAC of 3.2 million m^3 . Most of this - 3.0 million m^3 - is on the Island, while Labrador has an AAC of 0.3 million m^3 .

Softwood makes up 2.8 million m^3 of the total harvest, while 3% is hardwood. While all the hardwood harvested is for purposes of fuelwood, approximately 400,000 m^3 of softwood is harvested for fuelwood purposes.

Given these figures for AAC and harvest, it appears that Newfoundland has a softwood fibre surplus of 0.4 million m^3 , which implies a utilization rate of 87%. Thus, the AAC for Newfoundland has risen slightly over earlier estimates and the predicted fibre shortages have not yet occurred.

Quebec Fibre Supply

Introduction

Quebec's commercial forests cover just under half (47%) of the province's 1.7 million km² total land area. If the unproductive and nonforested lands are subtracted, the accessible productive portion of the commercial forest (APCF) covers nearly 550,000 km². Of this area, 430,000 km² is considered to be economically exploitable (APECF).

The Crown forest comprises 85% of Quebec's total APECF area and is the most important source of fibre for the province's forest industry. Of the total commercial forest growing stock, the public forest contains 94% of the softwood volume and 75% of the hardwood volume.

The majority of the Crown forest is mature. Of the total economically accessible and productive public forest growing stock, 71% is mature and 25% is immature. The remaining 4% of the volume is within Quebec's regenerated category.

Balsam fir, spruce and jack pine together satisfy 90% of the forest industry's wood fibre requirements. Spruce is the province's most important softwood species and comprises 48% (by volume) of the total productive and accessible public forest. Compared to softwoods, the hardwood component of the total public forest growing stock is small, only 21%. Second growth forests, originating from large clear cuts, support a greater hardwood component than did the original stand types. The most important hardwood stand types are maple, birch and poplar.

The private forest is also an important source of fibre for Quebec's forest industry. Over 99% of the private, commercial forest is economically exploitable (in terms of both area and growing stock) and this area accounts for 25% (108.9 km²) of the total APECF area. In terms of growing stock, however, private forests account for only 12% of the total APECF volume. Much of the private forest is immature. Of the total private APECF volume, 27% is mature, 68% is immature and 5% is in the regeneration category.

Even though 44% (186.3 million m³) of the private APCF's growing stock is comprised of softwood stand types, these private softwoods represents only 6% of the total provincial APCF volume. Hardwood stands, on the other hand, comprise 56% of the private forest volume and 23% of the total provincial APCF hardwood volume. From the point of view of the forest industry, the most important softwood types in the private forest are balsam fir, spruce and jack pine (comprising 12% of the private APCF volume). The most important hardwood species type is maple (comprising 25% of the private APCF volume).

Allowable Annual Cut

As shown in Table I-7, the total economically accessible allowable annual cut (AAC) for the province as a whole is 47.5 million m³. This estimate excludes the annual harvest volume specified for the pulpwood zone because it is generally felt that this volume is beyond the economic margin. Therefore, the AAC figures for public and private forests found below do not include the pulpwood zone.

Table I-7
Quebec's Economically Accessible
Allowable Annual Cut
(thousands of m³)

Public Forest	
Balsam fir, spruce, jack pine	25,377 ¹
Other softwoods	1,407
Hardwoods	8,022
	34,806
Private Forest	
Balsam fir, spruce, jack pine	4,214
Other softwoods	1,490
Hardwoods	6,959
	12,663
Total Economically Accessible	
Commercial Forest	
Balsam fir, spruce, jack pine	29,591
Other softwoods	2,897
Hardwoods	14,981
	47,469

¹ assumes basic management

Source: Quebec's Forest Resources and Industry

Crown forests supply the largest share (73%) of the total AAC. The public forest AAC is 34.8 million m³. Of the total public AAC volume, 77% (26.8 million m³) is softwood and 23% (8.0 million m³) is hardwood. Balsam fir, spruce and jack pine represent 73% of the public forest AAC.

Private forests account for 27% or 12.7 million m³, of Quebec's total AAC. Of this total volume, 55% is hardwood and 45% is softwood. Balsam fir, spruce and jack pine represent only 33% of the private forest AAC.

Harvest

Quebec's commercial forest harvest fluctuates from year to year from the average requirement of about 26 million m³ of softwood fibre and 4 million m³ of hardwood fibre. For example, the total harvest increased during the years 1970 to 1980 from 23.5 to 34.0 million m³. However, by the fiscal year 1982/83, the harvest had dropped to 24.1 million m³. As shown in Table I-8, the most recent total provincial harvest is 36.5 million m³, which is considerably above average. Excluding fuelwood, the harvest is 34.0 million m³, 92% of which is softwood. When fuelwood is included, Quebec's total harvest is the aforementioned 36.5 million m³.

Table I-8
Volume of Wood Harvested in Quebec
(thousands of m³)

	Excluding Fuelwood	Including Fuelwood
Softwood	31,242	31,698
Hardwood	2,743	4,821
Total	33,985	36,519

Source: Quebec's Forest Resources and Industry
Statistical Information 1985

The harvest from public land accounts for about 78% of the total harvest. The vast majority of this fibre (91%) is softwood and 97% of this softwood volume is composed of balsam fir, spruce and jack pine. If fuelwood is excluded, then 71% of the public harvest is composed of sawlogs and 29% is composed of pulpwood. The public forest is the chief source of both sawlogs and pulpwood, and it supplies 87% and 62% of these two products respectively. Of the hardwood harvested for purposes other than fuelwood, over 95% is of either sawlog or peeler quality. The majority of the hardwood volume (89%) is composed of poplar and birch.

The private forest supplies only 22% of the total harvest and it is dominated by pulpwood (64%). Softwood fibre composes about 76% of the private harvest and virtually all of this volume consists of balsam fir, spruce and jack pine. On average, the hardwood harvest is primarily poplar, birch and, to a lesser extent, maple.

Implied Surplus/Deficit

About 98% of the total sustainable softwood supply available to industry is harvested. Although a surplus of 0.8 million m³ is implied, regional analysis indicates overutilization and overcommitment in some areas. In public forests, softwood overutilization occurred in the administrative regions of Estrie, Montreal and the southwestern portion of Abitibi-Temiscaminque. However, if only spruce, pine and balsam fir are considered, then overutilization occurs in the Lac-Saint-Jean region as well. With regards to private forests, 87% of the softwood is utilized. However, as is the case for public forests, overutilization occurs in the following four administrative regions: Bas-St. Laurent-Gaspésie, Saquenay-Lac St. Jean, Quebec and Estrie.

Table I-9
Implied Fibre Surplus in Quebec
 (thousands of m³ per year)

	Implied Surplus	Utilization (%)
Total Economically Accessible Commercial Forest		
Softwoods	790	98
Hardwoods	10,160	32
Total	10,950	77

As shown in Table I-9, the provincial hardwood resource is significantly underutilized. Although only 32% of the available hardwood fibre is harvested, most of the available poplar/aspen is committed. In mixedwood stands, a significant volume of white birch is still available and this species is suitable for chemi-mechanical and chemical pulps. Most of the remaining hardwood surplus is high density species suitable only for chemical pulps and fuelwood.

The figures in Table I-9 mask the fact that, historically, there have been regional fibre shortages in Quebec. This is due to the overcommitment of wood fibre in several forest management units. Thus, while the overall regional harvest has not exceeded the AAC, overcommitment has occurred in subregions. Provisions in Quebec's new forest policy are designed to prevent the continuation of this practice.

The new Forest Act also designates wood fibre from the public forest as a supplementary source of supply for mills. Thus pulp mills are required to use chips/residues and pulpwood from private lands (softwood) before they can utilize pulpwood from Crown Lands.

Quebec's new forest policy also requires new management plans for all Crown Forest tenures--these plans are to ensure adequate provision for silviculture and sustained yield forest management. This is in keeping with an overall objective of the preservation and optimal allocation of Quebec's existing resources.

Ontario Fibre Supply

Introduction

Roughly 58% of Ontario's total area of 106.8 million hectares is forested. It is interesting to note that Ontario forests rank second, only slightly behind Quebec, in terms of the total forest area. From the point of view of productive forest land, however, Ontario ranks third behind Quebec and BC.

There are 39.9 million hectares of productive forests distributed over three main tenures in Ontario. The largest forest land owner is the province of Ontario and, as of 1985, the Crown lands accounted for 84% of the total productive forest area. The other two tenure groups, private and federal lands, account for 15% and 1% respectively.

The relative importance of Crown and privately owned forest land changes as one goes from north to south. In the northern four regions, the Crown accounts for about 93% of productive forest land, and this is organized into Management Units. Eastern, central and southern Ontario account for only 7% of the total productive area in the province. Of this productive forest, 89% is privately owned and only 11% is Crown timber, which is the reverse of the situation in northern Ontario. It should be noted that Crown Forests in southern Ontario are not organized into Management Units.

The total land area of Ontario's Crown forests is about 38.8 million hectares. As of 1985, 82% of this total was considered productive and available for harvest. The remaining area is classed as Protection Forest and is composed of protected portions of recreation reserves and provincial parks.

Ontario's available growing stock is estimated to be about 5.1 billion m³ and 86% of this volume is on Crown land; private and federal lands account for 13% and 1% respectively. Only about 5% of the Crown's growing stock is located in provincial parks; the rest is available for harvesting.

Spruce and jack pine are Ontario's two most important commercial stand types and comprise 40 and 13% respectively of the total growing stock volume. Other important softwood species are: white and red pine, balsam fir and hemlock. However, these latter stand types only account for about 8% of the growing stock. Hardwoods account for 37% of the growing stock and poplar stand types account for 54% of the hardwood stock. Other important hardwoods are sugar maple, white birch and yellow birch. These stand types comprise 21%, 19% and 2% respectively of the total hardwood growing stock.

Southern Ontario's forests, which include the remains of the original Deciduous Forest, are much more diverse than in the west; about 75% of the growing stock is hardwood, and nearly 85% of the total is on private lands. The most prevalent hardwood forest type is hard maple followed by poplar and birch.

Much of Ontario's forests are mature, or overmature. Of the total growing stock volume of 5.1 billion m³, 73% is older than 80 years and 29% is older than 100 years. This trend is true for both softwoods and hardwoods. Of the total softwood growing stock, 78% is older than 80 years and 36% is older than 100 years. The corresponding percentages for hardwoods are 73% and 29%. This trend of maturity holds even at the stand type level. For example, 54% of the jack pine growing stock is older than 80 years; 7% is older than 100 years. The corresponding percentages for spruce and poplar are: 90% and 49%, and 60% and 5%.

Maximum Allowable Depletions, Harvests and Reserves

The term Maximum Allowable Depletion (MAD) refers to the maximum area of forest land that may be depleted by any means (harvest, fire, insects, disease, etc.) over a five-year period. In order to translate MAD into an allowable cut, average timber yields per unit area have been adjusted to reflect anticipated losses due to nonharvesting causes (fire, etc.). These AAC estimates along with average harvest data are presented in Table I-10. For northern Ontario, the net volume available for harvest (i.e. MAD converted to volume minus losses due to fire and pathogens) is used. However, because of poor data availability, it has been assumed here that the AAC for southern forests equals the harvest. All the southern forests are economically accessible.

Table I-10
Ontario Estimates of
Annual Fibre Availability and Surplus
 (thousands of m³ per year)

	Estimated AAC	Harvest	Estimated Surplus Available For Use	Surplus as % Of AAC
Softwood	27,031	19,877	7,154	27
Hardwood	16,885	7,757	9,128	54
Total	43,916	27,634	16,282	37
Fuelwood		2,800		
Industrial Roundwood		24,834		

Source: OMNR; WRA data base

As shown in Table I-10, the estimated average AAC for softwoods is 27.0 million m³ (including fuelwood). The northern forests account for about 97% of this. For hardwood, the estimated average AAC is 16.9 million m³. Northern Ontario's forests comprise 81% of this.

The harvest estimates used here were determined from provincial data pertaining to 1986. In softwood, there was a total harvest of 19.9 million m³--96% of this from the north, and 4% from the south. The hardwood harvest was 7.8 million m³, but a smaller proportion--59%--was from the north, with 41% from the south. Fuelwood accounts for 560,000 m³ of the softwood harvested and 2.2 million m³ of the hardwood harvest.

Based on estimates of the AAC and harvest for both regions, the softwood stands of Ontario are more utilized than the hardwood stands. In softwood, there is an apparent surplus of 7.2 million m³, which implies a utilization rate of 73%. Hardwood shows a larger surplus of 9.1 million m³, or a utilization rate of 63%. It is assumed here that all surpluses are on Crown lands in the northern region.

From the point of view of physical volume, both the softwood and hardwood resources of northern Ontario appear to be underutilized, even though the vast majority of their forests are fully committed via Forest Management Agreements (FMA's) and shorter term harvesting rights.

Although there is unanimous agreement concerning a hardwood surplus in northern Ontario, both the OMNR and the regional forest industries question the existence of a softwood surplus. Reviews of selected FMA's have revealed that harvesting has fallen short of the maximum softwood volumes that could have been removed from the licence areas during the cut control period. This suggests that there is some surplus softwood, but uncertainties concerning inventory data and its proper interpretation cast considerable doubt upon the actual magnitude of the softwood surplus.

Fibre Supply in the Prairie Provinces

The Prairie provinces have a total wood volume of 2,557 million m³ on their inventoried, stocked and productive forest lands. Of this, 59% is softwood and 41% is hardwood. Spruce and pine are the primary softwood species and aspen/poplar the most prevalent hardwood.

The Allowable Annual Cut on economically accessible lands is 35.7 million m³. Softwood makes up 58% of this (20.8 million m³) and hardwood 42% (14.9 million m³). Harvest figures for softwood and hardwood are 11.8 million m³ and 1.7 million m³ respectively, totalling 13.6 million m³. Fuelwood accounts for 3% of the total harvest: 247,000 m³ is softwood, and 189,000 m³ is hardwood. These figures are provided in Table I-11.

Table I-11
Prairie Provinces
Average Harvest and Allowable Annual Cut
 (thousands of m³)

	AAC*	Annual Harvest	Indicated Surplus	Surplus as % of AAC
Manitoba¹				
- softwood	3,822	1,447 ²	2,375	62
- hardwood	1,949	177 ²	1,772	91
Total	5,771	1,624 ²	4,147	72
Fuelwood		205		
Industrial Roundwood		1,419		
Saskatchewan				
- softwood	3,286	2,506	780	24
- hardwood	3,107	985	2,122	68
Total	6,393	3,491	2,902	45
Fuelwood		133		
Industrial Roundwood		3,358		
Alberta				
- softwood	13,674	7,884	5,790	42
- hardwood	9,907	573	9,334	94
Total	23,581	8,457	15,124	64
Fuelwood		98		
Industrial Roundwood		8,359		
Total Prairies				
- softwood	20,782	11,837	8,945	43
- hardwood	14,963	1,735	13,228	88
Total	35,745	13,572	22,173	62
Fuelwood		436		
Industrial Roundwood		13,136		

* Excludes economically inaccessible regions

¹ AAC is for open, provincial Crown lands only (1986)

² Cut is average annual harvest for the five years from 1981-1985

Source: Provincial reports; WRA data base

The annual harvest figures can be subtracted from the AAC to determine an indicated surplus or deficit on commercially accessible lands. With respect to softwood, there is an indicated surplus of 8.9 million m^3 on the Prairies, which implies that 57% of available softwood is being utilized. Hardwood shows a total surplus of 13.2 million m^3 , or a utilization rate of 12%. In total, there is a surplus of 22.2 million m^3 of wood fibre, or an average utilization rate of 38%. Although these figures mask the fact that regional softwood shortages exist on the Prairies, there is little question that the Prairies' hardwood resources are underutilized.

Saskatchewan utilizes the highest proportion of its commercially available softwood and hardwood. Manitoba and Alberta utilize only 6% of their hardwood resources.

Future increases of economically accessible fibre reserves in the Prairie provinces depend on the expansion of road systems and other infrastructure into the currently inaccessible northern forests. This is presently taking place in the Nelson River area of Manitoba, which accounts for 296,540 m^3/y of wood fibre. In Saskatchewan, any development of the Turner Lake Block would open up an additional 615,000 m^3/y of fibre, however this is not expected to happen in the near future. Finally, Alberta's uncommitted AAC includes an additional 2.5 million m^3 from inaccessible forest. This volume, which is largely hardwood, has been excluded from the data of Table I-11. This, too, represents a resource which may be utilized in the long term.

The following provides a brief summary of each Prairie province's forest scenario.

Manitoba

Introduction

Manitoba's forested lands account for 334,000 km^2 of the province's total land area, 650,000 km^2 . Of this forested area, 128,000 km^2 is stocked, productive and unreserved.

The provincial Crown owns 89% (114,000 km²) of Manitoba's commercial forests. The remainder is held by private owners (7% or 10,000 km²), the Federal Crown (3% or 3,000 km²) and municipalities (1% or 1,000 km²). The setting of cutting rates and the allocation of cutting rights on provincial lands are under the control of the Department of Natural Resources, Forestry Branch. For forest management purposes, Manitoba's commercial forests are divided into 10 Forest Management Units.

Allowable Annual Cut, Harvest and Implied Surplus

Because of a poorly developed road system, a considerable portion of Manitoba's commercial forests is inaccessible. For the purposes of this study, the following regions are considered economically inaccessible and are excluded from the analysis of the provincial AAC.

Table I-12
Inaccessible Regions within Commercial Forests
(m³)

Region	Softwood AAC	Hardwood AAC	Total AAC
Churchill River	81,790	7,040	88,830
Hayes River	1,608,410	351,810	1,960,220
Lake Winnipeg East *	174,230	30,210	204,440
Nelson River*	231,440	65,100	296,540
Total	2,095,870	454,160	2,550,030

* only parts of region are excluded

Manitoba's total AAC on provincial Crown lands is 8.3 million m³, but excluding the inaccessible regions, shown in Table I-12, results in a total operable AAC of 5.8 million m³. Thus only 69% of Manitoba's AAC is economically accessible. The figures in Table I-11 indicate that 66% of Manitoba's accessible AAC is softwood (3.8 million m³), and the remaining 2.0 million m³ is hardwood. Black spruce and jack pine make up a large share of the total softwood AAC - 47% and 37% respectively. With regard to hardwood, the dominant species is aspen (78%), while balsam poplar makes up 12%.

The average total annual fibre harvest is about 1.6 million m³. Softwood accounts for approximately 90% of this, with the residual accruing to hardwood. Jack pine and spruce account for 99% of softwood, while 79% of the hardwood harvest is aspen and balsam poplar. Approximately 116,000 m³ of the softwood harvest and 89,000 m³ of the hardwood harvest is for fuelwood purposes. Given these harvest results, Manitoba shows an indicated surplus that is as follows:

Species Group	Million m ³ /y
softwood	2.4
hardwood	1.8
Total	4.2

Both softwood and hardwood fibre are underutilized, at rates of 38% and 9% respectively. In total, the forest industries of Manitoba utilize 28% of the economically available timber supply.

Nelson River and Hayes River are the most remote commercial forest units and their AAC's have been omitted from our computations. Hayes River makes up a significant volume of the inaccessible forests and no development of this region is anticipated in the near future. However, currently there is development in the Nelson River Area and improved road systems are likely to make these forest more accessible within five years. This area has a potential incremental capacity of 296,540 m³/y. Because of the small diameter of many of these trees, however, this new fibre resource would be more suited to pulp and paper manufacturing than the manufacturing of solid wood products.

Saskatchewan

Introduction

Saskatchewan has 178,000 km² of forested land; of this 89,000 km² is inventoried and productive. The total wood volume on these lands is 484 million m³. About 60% of this wood (293 million m³) is softwood, primarily spruce and pine. The remaining volume is hardwood (191 million m³), mostly aspen and poplar. Most of Saskatchewan's timber resources lie in the central and northern regions of the province.

The Provincial Crown owns 97% of Saskatchewan's forests, while the Federal Crown owns 1½% (reserves and parks); the remaining forest is held privately and is a negligible factor in harvesting. The major industrial operations in Saskatchewan hold Forest Management Licence Agreements. These ensure long term supply through cutting rights which cover specific areas or annual volumes.

Allowable Annual Cut, Harvest and Implied Surplus

Table I-11 provides the figures for Saskatchewan's AAC and average harvest. For this analysis, only economically accessible fibre reserves are taken into account. While the more northerly forests are classified as "potentially accessible" and are excluded from inventory and AAC estimates, there are also some areas within the commercial forests which are economically inaccessible. Here the AAC for the remote Turner Lake Management Unit, amounting to 615,000 m³/y of fibre, is excluded from our calculations, resulting in a commercially viable AAC of 6.4 million m³. Softwood accounts for 3.2 million m³/y and hardwood 3.1 million m³/y.

The average annual softwood harvest in Saskatchewan is 2.5 million m³ and hardwood is 1.0 million m³, amounting to a total of 3.5 million m³. Fuelwood accounts for 70,000 m³ of the softwood harvest, and 63,000 m³ of the hardwood harvest. Given these harvest figures, there is a commercially accessible surplus of 0.8 million m³/y of softwood and 2.1 million m³/y of hardwood. In total, Saskatchewan has a physical reserve of 2.9 million m³/y, which implies that the province utilizes 55% of its total fibre resource. The utilization rate is 76% for softwood and 32% for hardwood.

In general, Saskatchewan's hardwood species are well distributed throughout all the commercial forest zones. In particular, there is a relatively large surplus of aspen in each of the industrial zones. Hence, there are no apparent regional hardwood shortages.

While there is an indicated overall surplus of softwood timber, Saskatchewan suffers from regional shortages in areas close to mills. To meet size and quality requirements at existing sawmills and the one veneer/plywood plant, larger logs must be sorted from woods-run pulpwood and transported long distances across the province.

Despite the current regional softwood shortages, it is unlikely that the Turner Lake Management Unit will be made accessible in the short run. However, as fibre shortages persist, this area could provide an additional annual supply of 451,000 m³ of softwood and 158,000 m³ of hardwood.

Alberta

Introduction

Alberta has a total land area of 644,000 km² and over half of this is classified as forest land. Of the 349,000 km² of forested land, 216,000 km² (or 62%) is productive.

Alberta's total wood volume on inventoried, stocked and productive forest land is 1,438 million m³. Of this, 54% is softwood, amounting to 781 million m³. Spruce and pine account for 95% of softwood. Total hardwood volume is 657 million m³, comprised almost entirely of aspen and a much smaller volume of balsam poplar. Spruce and aspen are Alberta's most important species, in terms of volume, and account for over half of the forest inventory.

The Boreal Forest in Northern Alberta is the province's most important timber region and contains almost 90% of the growing stock. However, some northern regions of this forest are not considered economically accessible at present.

Apart from forests in parks and other reserves, approximately 90% of Alberta's productive forest land is owned by the provincial Crown. Less than 5% is held by private owners. Long term cutting rights to Crown timber are allocated via timber quotas (volume agreements) or Forest Management Area Agreements (area and volume allocations). Short term cutting rights for small volumes are distributed through a variety of permits.

Allowable Annual Cut, Harvest and Implied Surplus

The following table provides a recent breakdown of Alberta's AAC figures.

Table I-13
Alberta Allowable Annual Cuts
 (thousands of m³)

Region	Softwood AAC	Hardwood AAC	Total AAC
Total AAC	14,464	11,637	26,101
Committed AAC	9,575	1,531	11,166
Balance Uncommitted	4,889	10,046	14,935
- Designated Future Development	3,604	6,921	10,525
- Unallocated	1,285	3,125	4,410
Commercially Accessible	495	1,395	1,890
Inaccessible	790	1,730	2,520
Economically Accessible AAC	13,674	9,907	23,581

Alberta's total AAC is 26.1 million m³, 55% of which is softwood and 45% hardwood. With respect to the softwood AAC, a total of 9.6 million m³ is committed to usage under a variety of dispositions, under the authority of the Forests Act. In hardwood, 1.6 million m³ is committed yielding a total annual commitment of 11.2 million m³. It has not been calculated precisely how much of the total AAC is commercially accessible - in Alberta, this is left up to the company or industry which leases the forest. In Table I-13, it is assumed that all allocated AAC is economically accessible (that is, the sum of currently committed AAC and that designated for future development) as well as certain areas within the unallocated regions. Thus, an approximation of the total accessible AAC for softwood and hardwood is 13.7 million m³ and 9.9 million m³ respectively.

The annual harvest averages about 7.9 million m³ of softwood and 0.6 million m³ of hardwood, resulting in a total fibre harvest of 8.5 million m³/y. Fuelwood comprises 61,000 m³ of the total softwood harvest and 37,000 m³ of the hardwood harvest. There is an indicated surplus of 5.8 and 9.3 million m³ of softwood and hardwood respectively, and a total surplus of 15.1 million m³/y. It appears that Alberta utilizes 58% of its available softwood, and only 6% of its abundant hardwood fibre. Overall, the utilization rate is 36%. However, projects now under construction and/or in an advanced stage of planning should increase the harvest markedly.

It is likely that Alberta's softwood AAC will be revised upward in the future. Near-mature forests of substantial size in this province will reach merchantable age by the end of the century, opening up perhaps another 5 million m³ of expansion potential.

BC Fibre Supply

Introduction and Allowable Annual Cut

As of 1987, 52% (21.3 million hectares) of the total available Crown forest area in British Columbia was considered to be productive, available and suitable for timber production. The majority of this timber-producing land base (nearly 87%) is located within Crown administered Timber Supply Areas (TSA's); most of the remaining 2.6 million hectares is privately managed as Tree Farm Licences (TFL's).

In addition to TSA's and TFL's, there are several other land classes that should also be included in a summary of the industrial timber land base. The various forms of federal and private land account for about 1.6 million hectares of stocked, productive available forest land. The currently estimated operable allowable annual cut (AAC) for all tenures is given in Table I-14.

Table I-14
Allowable Annual Cut for British Columbia¹
(millions of m³)

	TSA's	TFL's	Other Tenures²	Total Volume
Coast	12,025	14,955	4,400	31,380
Interior	46,070	3,600	2,850	52,520
Total	58,095	18,555	7,250	83,900

¹ Excluding areas that are considered to be beyond the economic margin.

² Estimates for: Temporary tenures outside Tree Farm Licences, private regulated and unregulated lands, unregulated Crown land, Indian Reserves and other Federal lands.

British Columbia's commercial forests contain 8,630 million m^3 of mature timber of which 8,300 million m^3 are softwood. Roughly 93% of the provincial timber inventory is composed of either spruce, lodgepole pine, balsam fir, hemlock, western red cedar or Douglas fir growth types. These growth types represent the most important commercial softwood species in BC and softwoods account for about 99% of the provincial timber harvest. Small volumes of alder and cottonwood occur in the Coastal region, but the bulk of the hardwood inventory, mainly aspen, is found in the Interior.

In British Columbia, the softwood resources upon which allowable annual cuts are based are largely composed of sawlog quality timber with the lower quality timber types being excluded. Except for the northeastern portion of the Prince George Forest Region, the current AAC refers to softwoods only. An historical lack of interest in hardwoods has led to the practice of excluding stands with a significant hardwood component from the forest land base when estimating the AAC. The currently estimated deciduous AAC of 5.2 million m^3 pertains almost exclusively to aspen timber and most of this deciduous resource is in the northeastern portion of the province.

With such a large stock of commercial softwood timber it is not surprising that BC's allowable annual cut comprises the largest portion (about 45%) of Canada's sustainable softwood supply. As summarized in Table I-14, the total economically accessible AAC is estimated to be 83.9 million m^3 . The Coastal AAC is about 31.4 million m^3 , or 37% of the provincial total. The Interior of BC contains the bulk of the provincial growing stock, and as a result, the AAC in this region is 52.5 million m^3 , or 63% of the total allowable cut.

This AAC estimate is larger than previous estimates that placed the cut at about 76.5 million m^3 . There are two reasons for this higher estimate. The first pertains to the inclusion of some hardwood into the AAC apportionment (5.2 million m^3/y), and the second reflects the temporary increase in allowable cut and logging activity due to the salvaging of insect and fire damaged timber and other temporary allocations.

Provincially, 69% of the AAC (58.1 million m^3) comes from Crown lands managed as Timber Supply Areas. However, if the AAC is considered on a Coast versus Interior basis, a different picture emerges. On the Coast, 48% of the AAC, or 15.0 million m^3 , comes from Tree Farm Licences and 38% comes from TSA's. The remaining 14% of the cut (4.4 million m^3) can come from other tenures, including private lands.

In the Interior, TSA's account for 88% (46.1 million m^3) of the annual harvestable volume; TFL's at 7% are relatively unimportant and the remaining 5% comes from other tenures.

It should be mentioned that recent provincial policy changes will result in a redistribution of 5% of the AAC shown for Tree Farm Licences in Table I-14 to the Small Business Enterprise Program (SBEP) licence category in the TSA's. Additional redistribution of AAC allocation from other major licence types will also be made to the SBEP category. These changes in AAC apportionment should have no net impact on the total allowable cut.

Commitment and Harvest

Essentially the entire provincial softwood AAC is committed to existing industry. The allowable harvest from Tree Farm Licences is, by definition, committed to the licence holder. In the Timber Supply Areas, the AAC has been apportioned to either longer term licences, the Small Business Enterprises Program, and a small Forest Service Reserve which, in turn, is available for short term timber sales. The estimated AAC for "other tenures" (i.e. 7.2 million m^3/y) can be considered as fully utilized.

The timber harvest in BC now averages about 80 million m^3/y . The preliminary estimate for 1986/87, which is based on monthly data and is subject to upward revision, is shown in Table I-15. The Coast accounted for 36% of the harvest and the Interior 64%. The hardwood cut of 0.4 million m^3 was less than 1% of the total cut. Both on the Coast and in the Interior, fuelwood comprises approximately 100,000 m^3 of the softwood harvest, and 100,000 m^3 of the hardwood harvest.

Table I-15
Preliminary Estimate of the
1986/87 BC Timber Harvest
 (thousands of m³)

	Softwood	Hardwood	Total
Coast			
Vancouver	26,544.2	219.8	26,764.0
Prince Rupert	1,091.0	11.4	1,102.4
Other	589.9	0.1	590.0
Total Harvest	28,225.1	231.3	28,456.4
Fuelwood	100.0	100.0	200.0
Industrial	28,125.0	131.3	28,256.4
Roundwood			
Interior			
Vancouver	649.2	0.6	649.8
Prince Rupert	9,054.0	29.3	9,083.3
Cariboo	9,847.1	3.0	9,850.1
Kamloops	8,096.7	25.6	8,122.3
Nelson	6,576.4	12.0	6,588.4
Prince George	16,632.6	99.6	16,732.2
Total Harvest	50,856.0	170.1	51,026.1
Fuelwood	100.0	100.0	200.0
Industrial	50,756.0	70.1	50,826.1
Roundwood			
Grand Total	79,081.1	401.4	79,482.5
Fuelwood	200.0	200.0	400.0
Industrial	78,881.1	201.4	79,082.5
Roundwood			

On the Coast, western hemlock, balsam fir, western red cedar and Douglas fir are the leading species in the inventory and in the annual harvest. Minor volumes of spruce, cypress, pine, alder and cottonwood make up the remainder of the cut.

In the Interior, lodgepole pine and spruce, in approximately equal amounts, account for nearly 75% of the harvest. Balsam fir, Douglas fir, hemlock and western red cedar comprise most of the remaining volume. Amongst the hardwoods, aspen is by far the most important but this species still represents less than 1% of the harvest.

Incremental Fibre Supply - Coast

A comparison of Tables I-14 and I-15 shows that the AAC for Coastal forests is about 2.9 million m^3 higher than the current harvest. However, existing AAC's are largely based upon the sawlog quality portion of the timber resource, and as such cannot be maintained over the longer term. Assuming the existing level of forest management intensity, and including stands of lower quality timber which are currently excluded from the resource base used for AAC calculation, results in an estimated longer term sustainable harvest of approximately 33.4 million m^3/y .

If the above estimates are correct, they have some important implications for the nature of the future timber supply on the Coast. That is, even though a cutting level of 33.4 million m^3/y may be sustainable over the longer term, the proportion of sawlog quality timber will decline while the volume of lower quality (e.g. pulpwood) logs will increase significantly. It is not known whether or not this incremental supply of lower quality timber will be economically available.

Incremental Fibre Supply - Interior

According to the data of Tables I-14 and I-15, the AAC in the Interior Region is somewhat higher than the current harvest. However, as was the case with the Coastal Region, current AAC's are largely based on the better quality (i.e. sawlog) portion of the timber inventory and, on this basis, may not be sustainable over the longer run. It is also estimated that the inclusion in the AAC of lower quality softwood timber types as well as deciduous stands could result in a potential AAC of about 61.0 million m^3 --an increase of 8.5 million m^3/y . The longer term outlook for the log quality mix in the Interior is similar to that already postulated for the Coast--a decline in sawlog supply and an increase in pulpwood availability. Economic criteria will dictate the extent to which this potential pulpwood supply increment will be harvested.

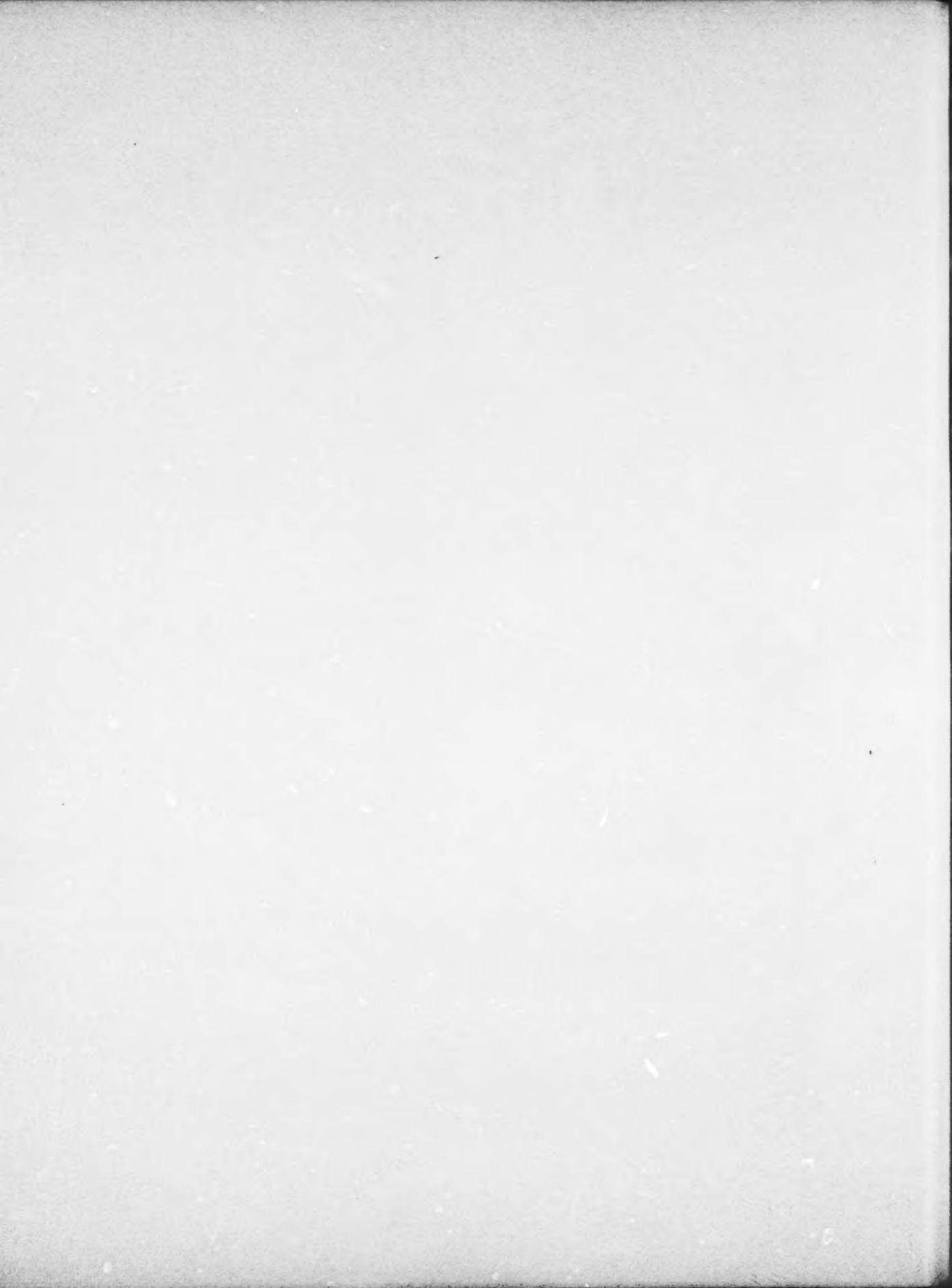
Summary

Current and potential longer term timber supplies in British Columbia are summarized in Table I-16. For the province as a whole, the net supply increment could be in the order of 10.5 million m^3/y with an increase of 8.5 million m^3 in the Interior. In the medium term (i.e. 15-20 years), the current, basically sawlog AAC's can be maintained. At the same time, softwood and hardwood pulpwood harvesting could be increased by an estimated 14 to 15 million m^3/y provided that this incremental supply is economically operable. In the longer term, the total harvest would decline unless there was a significant increase in yields expected from second growth stands.

In addition to the incremental roundwood supply shown in Table I-16 there is an estimated 2.5 million m^3/y of surplus softwood chips produced by Interior sawmills. Most of this chip volume is now exported.

Table I-16
Potential Annual Supply of
Incremental Timber in BC
(million m^3/y)

	<u>Current AAC Estimate</u>			<u>Est. Potential AAC</u>			<u>Est. Net Increment</u>		
	Coast	Interior	Total	Coast	Interior	Total	Coast	Interior	Total
Softwood	30.9	47.8	78.7	32.9	56.3	89.2	2.0	8.5	10.5
Hardwood	0.5	4.7	5.2	0.5	4.7	5.2	--	--	--
Total	31.4	52.5	83.9	33.4	61.0	94.4	2.0	8.5	10.5



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GLOSSARY OF TERMS

AAC	Allowable Annual Cut
APCF	Accessible productive portion of the commercial forest
APECF	Accessible productive portion economically exploitable of the commercial forest
BCTMP	Bleached chemi-thermomechanical pulp
BDMT	Bone dry metric ton
BKP	Bleached kraft pulp
Boreal Forest	The coniferous forests in the north of the Northern hemisphere
Chemi-mechanical pulp	Pulp produced by a wood grinding or chip refining process employing a mild chemical to improve strength or increase production
C\$	Canadian dollar
e.g.	for example
Est.	estimated
FMA	Forest Management Agreement
Freehold	A tenure by which land is held in fee simple
Greenfield	A new pulp and/or paper mill built on a site on which no other mill exists
ha	hectares
Hwd	hardwood
i.e.	that is
km	kilometre
km²	square kilometre
m	metre
m³	cubic metre

m³/y	cubic metres per year
MAD	Maximum Allowable Depletion
OMNR	Ontario Ministry of Natural Resources
OSB	Oriented strand board
%	per cent
Rationalization	To eliminate unnecessary equipment, personnel or processes from a mill in order to make it more efficient
Roundwood	Logs as delivered to a pulp mill, with bark attached and cut to specified lengths
SBEP	Small Business Enterprise Program (BC)
Swd	Softwood
TDA	Timber Development Area (Alberta)
TFL	Tree Farm License (BC)
TSA	Timber Supply Area (BC)
Value-added	Market value of production, minus the cost of material inputs
WRA	Woodbridge, Reed and Associates
y	year